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Non-Geographic Number Portability Task Force
PT1 : Service Description

BIPT

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1. Scope

The scope of this document is to describe Non-Geographic Number Portability in terms of high-level service definitions and terminology.

The following topics will be discussed in this document:

- Regulatory Requirements;
- Explanation of the definitions and abbreviations used in Non-Geographic Number Portability;
- High level service description of Non-Geographic Number Portability;
- Expectations of both the service users, service subscribers, and, service providers;
- A high level description of the responsibilities of the different entities involved in providing Non-geographic Number Portability;
- Inter-operating aspects with other services;
- Implementation requirements;
- Quality of Service.

The scope of the requirements is limited to :

- the portability of individual non-geographic numbers;
- the portability of complete number blocks as assigned to a service provider.

For the sake of clarity, the following number portability types are out of the scope of this document:

- Number Portability for Mobile Numbers and Paging Numbers;
- Number Portability for Geographic Numbers.

The issue of incoming international traffic to ported non-geographic numbers requires further study and is not covered in this Specification document.

2. Regulatory Requirements

This document serves as a basis to introduce Non-Geographic Number Portability in Belgium. Belgian legislation for this matter is currently in preparation. The EC regulatory framework is derived from :

Directive 98/61/EC of the European Parliament and of the Council of 24 September 1998 amending Directive 97/33/EC

3. References

[1] ETSI TR 101 119 – High Level service description of number portability
[2] ETSI TR 101 122 Numbering in number portability
3 ETSI TR 101 118 – Network architecture in Number portability
4 Number Portability Task Force – PT1 Service Description Number Portability forGeographic Numbers

4. Definitions and Abbreviations

4.1 Definitions

The following definitions and terms will be used in the context of the different project teams involved in the implementation of non-Geographic Number Portability in Belgium.

- **Block Portability**

  Re-assignment by the BIPT of an already assigned block of numbers from one service provider (the initial Number Allocated Service Provider) to another service provider (the new Number Allocated Service Provider).

- **Call Trap Function**

  The function whereby a mechanism is employed to determine whether or not a number is ported.

- **Database Query Function**

  The function whereby a database is accessed in order to ascertain whether a number is ported, and if it is, Routing Information is obtained that may be used to route the call to the appropriate destination.

- **Directory Number**

  A number in the national numbering scheme that is allocated to a customer for a telephony service.

- **DonorPlatform**

  The platform from which the number was ported-out.

- **Explosive Traffic**

  Traffic to a single destination with a certain number of call attempts (X call attempts/second; X to be defined) that is high enough to disturb the normal traffic in the network, and that has an answer to call attempt ratio that is below a certain level (answer/call attempt < Y %; Y to be defined).

- **Geographic Number**

  An E.164 number as defined in the Royal Decree on the Management of the Numbering Plan of 10 December 1997.

- **Geographic Number Portability**

  The Geographic Number Portability as described in the law corresponds to Network Operator Portability. As and when applicable, this encompasses Location Portability and/or Service Portability.

- **Location Portability (also called Number Mobility)**

  The ability of an end user to retain the same E.164 number when moving from one location to another within the same numbering area, without changing network operator nor the nature of the service offered. Location portability is only applicable to Geographic Number portability

- **Network Operator**

  Entity which has been reserved or assigned geographic E.164 numbers by the BIPT and this encompasses the public network authorization. The term Network Operator is only used in the context of geographic Number Portability (see also Service Provider).

- **Network Operator Portability**

  The ability of an end user to retain the same geographic E.164 number when changing from one network operator to another without changing location nor the nature of the service offered. Network Operator Portability[1] can be concatenated with Location Portability (LP) and/or Service Portability (SP). Network Operator Portability is only relevant for Geographic Number Portability.

- **Non-Geographic Number**

  A Directory number that is not a Geographic number and not a Mobile number (starting with 04XX prefix). Refer to Section 5 for an overview of Non-Geographic numbers.

- **Non-Geographic Number Portability**

  The ability of a service subscriber to retain the same non-geographic E.164 number when changing from one Service Provider to another without changing the nature of the service offered.

- **Number Allocated Network Operator**

  The Network Operator to which the number block to which the ported number belongs, is assigned by the BIPT. Number Allocated Network Operator Portability is only relevant for Geographic Number Portability

- **Number Allocated Service Provider**

  The Network Operator to which the number block to which the ported number belongs, is assigned by the BIPT. Number Allocated Network Operator Portability is only relevant for Geographic Number Portability

- **Number Portability Routing Information**

  Information that allows the call to be routed to the recipient platform.

- **Originating Network**

  The network to which the calling party is connected. International call handling requires further study.

- **Platform**

  The entity within a Service Provider's technical infrastructure that provides non-geographic number based services.

- **Point of Interconnection**

  The physical point located on the interconnect link where two networks are interconnected (and through which the calls are handed over from one network to another). The POI is the boundary between the operators' domains of responsibility.

- **Ported Number**

  A Non-Geographic number that has been subject to number portability.

- **Ported-In Number**

  A Non-Geographic number that has been subject to number portability and that has been ported into a recipient platform.

- **Ported-Out Number**

  A Non-Geographic number that has been subject to number portability and that has been ported out of the donor platform.

- **Range Analysis Function**

  The function whereby a number of significant digits of a number are examined in order to determine the appropriate routeing to a destination entity.

- **Real-Time Database**

  Database that contains the Number Portability Service routeing information and that is used in real-time by the data query function of the serving network.

- **Recipient Platform**

  The platform to which the number is ported-in.

- **Reference Database**

  Database that contains the Number Portability Service routing information and that is used as reference for the consistency of the real-time databases.

- **Routing Information Addition Function (RIAF)**

  The function which determines and adds the information necessary to enable the call to be routed to the recipient platform.

- **Serving Network**

  The network that performs all or part of the serving functionality. The serving functionality may be split across multiple networks/platforms, and may reside in the Originating network, Transit network, Donor Platform or Recipient Platform.

- **Serving Functionality**

  The serving functionality consists of the following functions:
  - the Call Trap function;
  - the Database Query function;
  - the Routeing Information addition function;
  - the Range Analysis function.

- **Service Portability**

  The ability of a service subscriber to retain the same E.164 number when changing from one type of service to another within the same service domain (in this scope the service domain corresponds to the services using geographic numbers), without changing network operator nor location. Service Portability is out of the scope of non-Geographic Number Portability

- **Service Provider (SP)**

The Service Provider is the Telecommunications operator to whom the non-geographic number blocks have been assigned by the National Regulation Authority (BIPT).

- **Service subscriber**

The Service Subscriber has a contract with the Service Provider for the usage of a subseries of non-geographic numbers or an individual number. The Service Subscriber uses this subseries in support of its application.

- **Service User**

The end user calling the non-geographic number.

- **Transit Network**

A network between two networks or between a network and a platform or between two platforms

4.2 Abbreviations

BP	Block Portability
CCBS	Call Completion to Busy Subscriber
CLI	Calling Line Identity
CTF	Call Trap Function
DDI	Direct Dialling In
DN	Directory Number
DQF	Database Query Function
GN	Geographic Number
GNP	Geographic Number Portability
ISDN	Integrated Services Digital Network
LP	Location Portability
NANO	Number Allocated Network Operator
NDC	National Destination Code
NM	Number Mobility
NO	Network Operator
NOC	Network Office Code
NP-DB	Number Portability Database
NSN	National Significant Number
OP	Network Operator Portability
PIN	Ported-In Number
PN	Ported Number
POI	Point of Interconnection
PON	Ported-Out Number
PSTN	Public Switched Telephone Network
RAF	Range Analysis Function
RFDB	Reference Database
RI	Routeing Information
RIAF	Routeing Information Addition Function
RN	Routeing Number
RP	Routeing Prefix
RTDB	Real-Time Database
SP	Service Provider

5. Service Definition

Non-Geographic Number Portability refers to the case where a subscriber to the non-geographic number (service subscriber) retains its originally assigned directory number while changing Service Provider, without changing the nature of the service.
The following parties intervene in the exploitation and usage of a non-geographic number based service :

Service Provider – the Telecommunications operator to whom the non-geographic number blocks have been assigned by the National Regulation Authority (BIPT).

Service Subscriber – is the customer of the service provider; i.e. he uses the non-geographic number for supporting his application.

Service user – dials the non-geographic number.

Non-geographic number portability ensures portability at the Service Provider level.

Involved Services

Non-geographic number portability covers the following services and accompanying numbering types.

Free Phone Services – 0800; not including international 0800.
Premium rate services – 090X/077 including Infokiosk and Televoting services.
Personal numbers – 0700
Universal service numbers – 070
Split Charging Numbers -- 078

It should be stressed that the scope of this project involves number portability and as such does not enter into the specificity of service portability

Types of Portability

Portability can be implemented on three entities :

An individual number
A sub-series of non-geographic numbers, assigned to a service subscriber
A full number block as allocated by the BIPT.

Types of Traffic

A distinction should be made between numbers generating normal traffic flows and numbers generating explosive traffic. Porting numbers with associated explosive traffic requires specific considerations as outlined in Section 16. A definition of explosive traffic is currently not available and is currently at the discretion of the network operators.

6. Service Description

In today's environment, in the absence of Non-Geographic Number Portability, non-geographic telephone numbers are directed to service providers on “block assigned” basis, i.e. service provider notify among them which number blocks are assigned to them and routing of traffic is configured accordingly. With the implementation of Non-Geographic Number Portability, which allows Service Providers to serve numbers originally assigned to other service providers, this routing scheme can no longer be used. If normal call routing would be used, the call would be delivered to the old platform where the subscriber was initially served (the donor platform).

Therefore, to allow service subscribers to switch from one Service Provider while maintaining their non-geographic numbers, routing of calls to ported numbers can no longer be based on the “Block assigned” basis. Routing Information has to be obtained to allow the routing of the call to the new service provider’s platform serving the ported subscriber (the recipient platform).

The Routing Information for service subscribers, who have moved or ported to another service provider, is usually stored in a Number Portability Database (NP-DB). This database contains the directory numbers of all ported non-geographic numbers and the Routing Information to allow a call to the ported number to be routed. Two types of NP-Databases can be used: Reference Database(s) and Real-Time Databases (e.g. one for each service provider). The NP-Database can be integrated in the switches or can be accessed by the switches using e.g. an intelligent network application protocol (INAP).

The determination of the Number Portability Routing Information for a call to a ported number, which is part of the Serving Functionality, may occur in the originating network, the transit network or the donor platform.

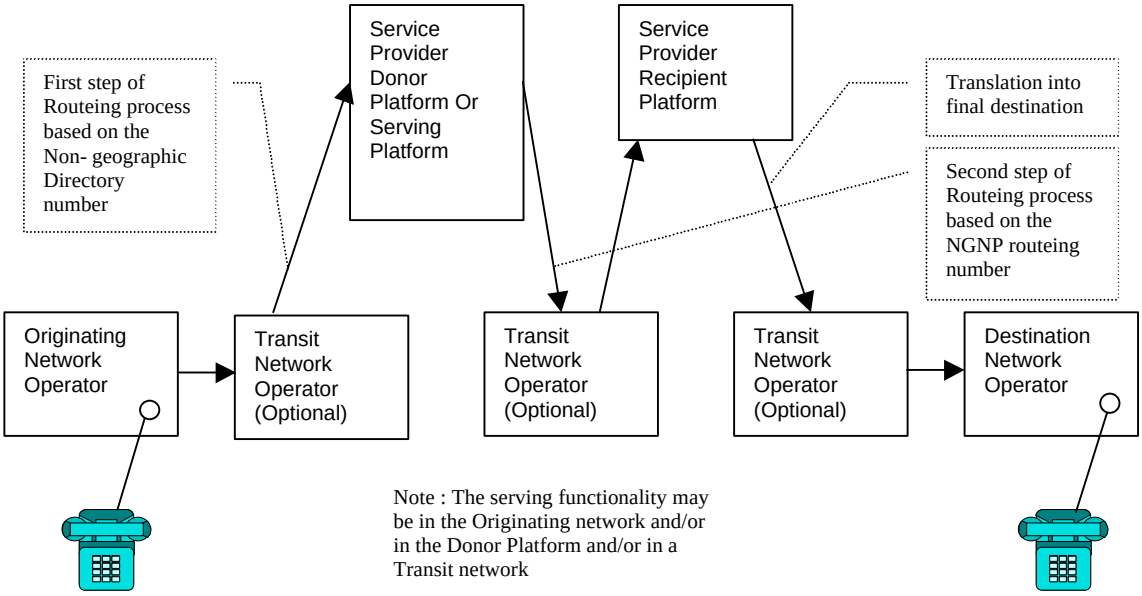

Figure 1: Conceptual Framework for Terminating Calls to Ported Numbers

The whole process associated with the termination of a call to a ported number is depicted in Figure 1.

7. Service Provider Responsibilities

7.1 Routing of Calls to Ported Numbers

In this section the responsibilities of the service providers involved in routing a call to a ported number are described, limited to number portability functions.

Originating Network
The Originating Network is the network where the call is originated. It should be noted, however, that for the purposes of this document, in case carrier selection is employed, the selected carrier's network becomes the Originating Network for number portability issues. Hence the network to which the caller is directly connected shall not perform any Number Portability Function**.**

If the originating network is at the same time the Recipient platform or a Serving network, the routing functions as described in the relevant sections below should be carried out. Otherwise, the Range Analysis Function should be carried out to route the call towards the Donor platform, possibly via a Transit Network

Transit Network
The Transit Network should transparently carry the call between two Serving networks. It is a pure transport mechanism.

If the Transit Network is acting as a Serving network, it should carry out functions as described in the Serving network section. If it is not, the Transit Network should

- *if no Routing Information has been previously added or inserted*, carry out the Range Analysis Function on the called party number to route the call towards the donor platform (possibly via another Transit Network);

- *if there is Routing Information previously added or inserted by another network*, carry out the Range Analysis Function on the Routing Information and/or called party number to route the call towards the recipient platform (possibly via another Transit Network)

Donor Platform
There are no specific requirements of the Donor platform, unless it is performing serving functionality.

Recipient Platform
The Recipient platform should use the Routing Information and/or the called party number to route the call to its final destination.

Serving Network
The Serving functionality may be split across multiple platforms, and may reside in the Originating network, Transit network or Donor platform. The following functionality should be carried out :
- The Call Trap Functionality should be carried out to determine that a number may be ported;
- The Database Query Function should be carried out to determine the Routing Information;
- The Routing Information Addition Function;
- The Range Analysis Function should be carried out on the Routing number and/or the called party number to direct the call towards the Recipient platform (possibly via a Transit Network)

7.2 Number Management

In this section, the responsibilities related to the service provision and number management are described.

Donor Service provider
The Donor Service Provider must not reallocate ported numbers to another service provider.

Recipient Service Provider
The Recipient Service Provider must inform the Donor Service Provider and Serving Service Provider of any change in the circumstances associated with any ported number that may affect calls being delivered to a ported number. The Recipient SP will inform the Donor SP, Serving SP and Number Allocated Service Provider when a service subscriber has given up a Ported Number.

8. Subsequent Portability

Once a number has been ported to one SP, the service subscriber may wish to switch again to another SP, still retaining the original number. Provided the customer is not returning to the operator from whom he first obtained the number, these subsequent changes of SP are known as 'Subsequent Portability'. So far as the Number Allocated SP is concerned, it makes no difference, whether the portability it is providing is an initial or a subsequent porting. Subsequent Portability increases the normal operational complexity since a third party – a 'new' recipient SP is involved.

When a customer seeks to port their number a second time, creating a chain of Donor platforms should be excluded.

9. Block Portability

The workgroup has not exhaustively dealt with Block Portability at this stage.

10. Network Impact

Below are but a few of the impacts that non-geographic number portability will bring to the telecommunications network and platforms.

Switching Network
In case the non-geographic number based service is delivered "switch-based", substantial changes to call-processing logic and administration software can be required in all switching systems in use in today's telecommunications network.

Signaling Network
Non-geographic number portability will require an NP-Database query for every call to a ported number. This will require capacity increases in the number of SS7 links to the Signaling Transfer Points, and in the event deployment of new Service Control Points to run the NP-database application.

Billing, Administration, and Maintenance Systems
Since number portability removes the unique link between an SP and its assigned block, changes will be required in most of the billing systems. For example, Call Data Records that used to generate end user billing may be treated differently; Also, customer service processes and support tools may have to be adapted.

11a. Service Subscriber Expectations

Solutions to provide number portability should assure the following generic assumptions :

- Only E.164 number (NSN) should be considered eligible to be ported.
- In some cases not a single E.164 number but a collection of E.164 numbers may be requested to be ported. This is referred to as Sub-series porting.
- The privacy of the user that has ported his number should be granted. That means that the calling party should not be informed that the called party has ported his number.
- Number portability should not affect the call dialing procedures.
- Calling Line Identity Presentation should be handled transparently.
- The mechanisms by which portability is provided should subject the call to minimal (if any) performance degradation relative to that offered to non ported numbers. This includes both post dial delay and transmission
- Service subscribers will get access to services determined by the Service Provider to whom they are connected, minimizing the difference in service offer to ported-in and non-ported numbers.
- Service subscribers expect to have a continuous service.

11b. Service User Expectations

- The service user expects to have continuous service.
- The mechanisms by which portability is provided should subject the call to minimal (if any) performance degradation relative to that offered to non ported numbers. This includes both post dial delay and transmission.

  Calling Line Identity Presentation should be handled transparently.

12. Implementation Requirements

1) Architectural Flexibility: The set of architectures selected for support of number portability should allow SPs reasonable flexibility in the manner in which the architecture is implemented, and should not prevent the use of equipment from a multi-vendor environment. Each SP should be able to decide about its own platform architecture, functions and design of internal interfaces, as long as external requirements are fulfilled.
2) Transparency: The mechanism by which portability is provided should be transparent to service subscribers of ported and non-ported numbers.
3) Performance: The mechanism by which portability is provided should subject the call to minimal (if any) performance degradation relative to that offered to non ported numbers. This includes both post dial delay and transmission.
4) Interconnection: All SPs offering non-geographic number portability within the same service (0800/0900/…) should interconnect, either directly, or via a transit, and complete calls. Direct or transit interconnection is a commercial decision.
5) Efficient use of numbering resources: Because of the scarceness of the numbering resources in Belgium, numbering resources should be used efficiently.
6) Migration and evolution: Solutions to support number portability should allow rapid deployment of number portability in such a manner that SPs can migrate between technical solutions. Solutions should be developed such that technology should not be presented as a barrier to implementing number portability. Each SP should be able to decide about its own network architecture, network functions and design of internal interfaces, as long as external requirements are fulfilled.

7) Subsequent Porting: When a service subscriber seeks to port their number a second time, creating a chain of Donor platforms should be excluded.
8) Only the E.164 number (not including prefixes (0), suffixes, etc.) should be considered eligible to be ported.
9) The entire E.164 number and not only part of it should be ported.
10) In some cases the customer may request the porting of a collection of E.164 numbers (a sub-series).
11) The privacy of the service subscriber that has ported his/her number should be granted. That means that the calling party should not be informed that the service subscriber has ported his number.
12) Number portability should not affect the call dialing procedures.
13) CLI should be handled transparently throughout the porting procedure.
14) Introducing number portability must not adversely affect conformance with national or international propagation and echo standards.
15) It should be ensured that the preferred solutions are compatible with one another and provide a migration path between introductory solutions and long term solutions.

13. Operational expectations

Many administrative steps will be required to move or "port" a non-geographic number from one SP to another. The roles of each of the intervening parties are described in Section 7.1.

- The service subscriber has the right to request the donor or the recipient service provider to initiate non-geographic number portability.
- The service subscriber will be informed about the exact time of porting.
- An acceptable synchronization delay is required to hand-over the number between the SPs.
- The number of the service subscriber will be ported between the SPs in a reasonable time period respecting the contractual termination period, the implementation period and any other time constraint required for porting a number between SPs.
- Operational requirements related to block portability are described in Section 9.

14. Impact on Other Services

Service subscribers will get access to services determined by the Service Provider to whom they are connected, minimizing the difference in service offer to ported-in and non-ported numbers.
Calling Line Identity Presentation should be handled transparently.

15. Quality of Service

When a number is ported, additional times are incurred that may degrade performance. Two elements combine to create the additional time:

- the look up time (time requested by the Database Query Function);
- subsequent connect time (time requested to subsequently route the call to the correct destination).

The extra set-up delay for a ported number should ideally be less than 1s compared to the post dial delay for a non-ported number.

16. Portability of Explosive Traffic Handling Numbers

In porting non-geographic numbers that carry explosive traffic, SPs should ensure that no impact is created on normal PSTN traffic,normal non-geographic traffic, and carrier select traffic handling.