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*Technical report*

## **Network Aspects (NA); High level description of number portability**

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*European Telecommunications Standards Institute*

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## Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Network Aspects (NA).

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# 1 Scope

The present document is to describe Number Portability. For the purpose of this study Number portability is limited to the Service Provider Portability for Geographic Numbers (GNP) and Non Geographic Numbers (NGNP) in the National Fixed Network, e.g. number portability between Service Providers within geographic country boundaries. An exception to this is Number Portability of the European Telephony Numbering Space.

In order to describe number portability, the present document provides:

- an overview of number portability;
- a description of the responsibility of the different entities involved;
- a description of number portability in the European Telephony Numbering Space (ETNS);
- background material to concepts used in related documents TR 101 118 [1], TR 101 122 [2] and EG NA-061501 [3] describing:
  - possible internal architectures;
  - numbering and addressing;
  - signalling;
  - Intelligent Network (IN) Options.

The present document describes the responsibilities of the various entities involved in number portability in order to deliver calls to numbers that have been ported. The present document also identifies the information requirements of the various entities necessary to manage and implement Number Portability.

Service management and inter-operator procedures have been demonstrated to be the major area of difficulty when introducing number portability. Detailed considerations of these issues are outside the scope of the present document

The scope of the requirements is limited to:

- the portability of individual customer numbers;
- porting of individual Multiple Subscriber Number (MSN);
- porting of complete Direct Dialling In (DDI) ranges.

However, whilst it is not possible to port single numbers from a DDI range, dividing the range into blocks and porting the resultant sub block will have the same effect. Therefore there is no need to support the portability of individual numbers within a DDI range.

The results of the study should ensure:

- 1) Architectural Flexibility: the set of architectures selected for support of number portability should allow network operators reasonable flexibility in the manner in which the architecture is implemented, the use of equipment from multi vendors;
- 2) Transparency: the mechanism by which portability is provided should be transparent to the ported and non ported customers;
- 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 network operators offering portability within the same geographic area should interconnect, either directly, or via a transit, and complete calls. Direct or transit interconnection is a commercial decision.

The following Portability types are out of the scope of this study, but are described for completeness:

- service Provider Portability for Mobile Numbers;
- service Portability;
- location Portability.

The impact of a ported non geographic number resolving to a geographic number has been raised as an issue, and is for further study.

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## 2 References

References may be made to:

- a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or
- b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or
- c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or
- d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] TR 101 118 (1997): "High Level Network Architecture and Solutions to support Number Portability".
- [2] TR 101 122 (1997): "Numbering and Addressing for Number Portability".
- [3] Draft EG NA-061501: "IN & Intelligence Support for Service Provider Number Portability".
- [4] ITU-T Recommendation E.164: "The International Public Telecommunication Plan".
- [5] TR 101 073 (1997): "Number Portability for pan European Services".

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## 3 Definitions and Abbreviations

### 3.1 Definitions

#### 3.1.1 Entities

**Network Operator:** An entity that operates a network in order to route calls.

**Service Provider:** An entity that offers services to users involving the use of network resources. The "Service Provider" is understood in the present document in a generic way and may have different status according to the service provided. For example, "Service Provider" refers to a local loop operator in the case of Geographic Numbers, or to a mobile operator in the case of Mobile Numbers, or to a service operator / reseller in the case of Service Numbers.

#### 3.1.2 Service provider portability

**Donor Service Provider:** The Service Provider from whom the number was initially ported.

**Recipient Service Provider:** The Service Provider to whom the number is ported.

**Service Provider Portability for Geographic Numbers (also known as geographic number portability, GNP; also known as local number portability, LNP):** A service that enables a customer to resign their subscription with a Service Provider and to contract another subscription with another Service Provider without changing their Geographic Number, without changing their location, and without changing the nature of the service offered.

**Service Provider Portability for Non-geographic Numbers (NGNP):** A service that enables a customer to resign their subscription with a Service Provider and to contract another subscription with another Service Provider without changing their Non-geographic Number, and without changing the nature of the service offered.

**Service Provider Portability for Mobile Numbers:** A service that enables a user to resign their subscription with his current Mobile Network Operator and subscribe to a competitor without changing their number.

**Service Provider Portability for Pan-European Services:** A service that enables a user to resign their subscription with their current Pan European Service Provider and subscribe to a competitor without changing their number.

### 3.1.3 Location portability

**Location Portability:** A service that allows a customer to retain his Directory Number when changing their premises in a certain area.

Four variants of location portability can be seen to exist:

- within exchange area;
- within numbering area;
- within charge area;
- anywhere.

### 3.1.4 Service portability

**Service Portability:** A service that allows a customer to retain their Directory Number when they are offered a new service, e.g. telephone service (fixed) to mobile telephone service (PLMN).

### 3.1.5 Numbers

DIRECTORY NUMBER				
GEOGRAPHIC NUMBER	NON-GEOGRAPHIC NUMBER			
	ETNS Number	Mobile Number	Service Number	Other Non Geographic Number

**Figure 1: Relationship between Geographic and Non Geographic Numbers**

NB: These are examples of non geographic numbers only, and are not prescriptive

**Directory Number (DN):** A number in the national numbering scheme that is allocated to a customer for a telephony service. Allocation of the Directory Number is made directly by the Numbering Plan Administration (NPA) to the customer, or indirectly when blocks of numbers are managed by Service Providers. The Directory Number is the number that is dialled by the users to reach the customer (potentially with prefix and/or with suffix).

**Geographic Number (GN):** A Directory Number from that part of the national numbering scheme that is used to identify fixed line terminations. Prior to Number portability these numbers are geographical in that sense that they convey the location of the customer.

**Non-geographic Number (NGN):** A Directory number that is not a Geographic Number. A Non-geographic Number does not imply the location of the customer.

**Mobile Number:** A Directory Number from a specific range of the national numbering scheme reserved for customers to mobile service(s).

**Service Number:** A Directory Number from a specific range of the national numbering scheme reserved for specific category of services, e.g. premium rate services, personal numbers.

While the definitions above refer to the identity of the customer for other users, the definition below refers to numbers used by the networks only. This definition is further developed in TR 101 122 [2]

**Routeing Number:** A specific number that is added and used by the networks to route the call. The Routeing Number conveys information useably by the network. If the digits dialled by the user match the digits of a routeing number, the dialled digits should not be interpreted as a routeing number.

**Ported Number:** A number that has been subject to number portability.

### 3.1.6 Networks

**Donor Network:** The initial Network where a number was allocated by the NPA before ever being ported.

**Recipient Network:** The Network where a number is located after being ported.

**Transit Network:** A network between two networks, e.g. . the recipient network and the donor network.

**Originating Network:** The network where the calling party is connected.

For most incoming international calls, the originating network is effectively the network containing the international gateway.

For carrier selection, the first exchange of the selected carrier effectively becomes the originating network for routeing purposes.

**Serving Network:** The network that determines whether a number has been ported, and, if so, provides an appropriate routeing number. This functionality may be distributed.

### 3.1.7 Exchanges

**Donor Exchange:** The initial Exchange where a number was located before ever being ported.

**Recipient Exchange:** The new Exchange where a number is located after being ported.

**Transit Exchange:** An exchange between two exchanges, e.g. . the recipient exchange and the donor exchange.

**Originating Exchange:** The exchange where the calling party is located.

For most incoming international calls, the originating exchange is effectively the international gateway.

For carrier selection, the first exchange of the selected carrier effectively becomes the originating exchange for routeing purposes.

### 3.1.8 Functions

**Range Analysis Function:** The function whereby a number of significant digits of a number (Called Party or Routeing) are examined in order to determine the appropriate routeing to a destination entity.

**Call Trap Function:** The function whereby a mechanism is employed to determine that a number may be ported.

**Database Query Function:** The function whereby a database is accessed in order to ascertain whether a number is ported, and if it is, a Routeing Number is obtained that may be used to route the call to a destination. The database could form part of an IN implementation, could be embedded within the switch, or could be some form of other off-switch database.

**Number Translation Function:** The function whereby a number (Routeing or Called Party), is translated to a destination number, possibly according to special conditions such as time of day, in order that calls can be completed.

**Routeing Number Addition Function:** The function which identifies a recipient and adds the appropriate routeing number.



### 3.1.9 Other definitions

**Number Plan Authority (NPA):** Entity that is responsible for the administration and the assignment of numbers, or number blocks, within a national numbering plan.

**National Numbering Plan:** A national Numbering Plan is a scheme that structures the numbers used and the numbers space available in a country.

**Point of Interconnection:** An access point between 2 Networks.

**Number Range Holder:** An entity who is responsible for the administration and allocation of numbers within a particular range.

**ETNS Regulatory Authority:** The body responsible for the regulation of services provided over the European Telephony Numbering Space.

**Geographic Number Portability:** See Service Provider Portability for Geographic Numbers.

**Non Geographic Number Portability:** See Service Provider Portability for Non Geographic Numbers.

## 3.2 Abbreviations

For the purposes of the present document the following abbreviations apply:

CCBS	Call Completion to Busy Subscriber
EN	European Number
ENTF	European Numbering Task Force
ETNS	European Telephony Numbering Space
IN	Intelligent Networks
CEU	Commission of the European Union
MSN	Multiple Subscriber Number
DDI	Direct Dialling In
GNP	Geographic Number Portability
NGNP	Non Geographic Number Portability
NPA	Numbering Plan Administration
DN	Directory Number
RN	Routeing Number

## 4 Objectives

The following objectives have been used in developing solutions.

Objective	Rationale
Seek and develop internationally standardized solutions as far as possible.	C7 signalling is based upon international standards and the objective is to evolve in line with standards (avoid proprietary solutions as far as possible). number portability solutions therefore need to be established internationally in order to facilitate standards development.  To allow a multivendor environment.
Focus upon interconnect (inter-network) standards rather than intra-network solutions.	Operators need to be in control of its own network architecture and signalling systems. Solutions that "standardize" the inter-network relationship allow that freedom.
Seek and develop solutions that enable operators, as far as possible, to remain in control of its own network call control processes.	The network operator should not be required to be dependant upon another operator or organization for the real-time control of its network.
Solutions should not be based upon specific technologies.	Technology will advance rapidly whilst interconnect agreements will change at a slower pace. Solutions should avoid use of specific technologies.
Standardise basic building blocks and functions rather than monolithic solution.	The solutions for number portability need to meet different regulatory and technical requirements. The solutions standardized should be capable of satisfying different network architectures and regulatory requirements.  In a multi-operator environment solutions should allow operators to decide on a commercial basis if they wish to perform number portability functions. Clearly there has to be a base requirement which will have to be met by the set of operators involved.
Co-existing phased solutions.	The network operator will require the rapid introduction of number portability based upon EXISTING infrastructure. Solutions should be capable of rapid deployment and be capable of evolving towards a long-term solution. Each phase should be capable of co-existing with previous ones. No compulsion on an operator to have to upgrade.
Address solutions for both connection control (basic call routeing) as well as for non-call/circuit associated services.	Current number portability solutions focus upon call routeing. There are significant problems associated with the support of services like Call Completion to Busy Subscriber (CCBS) which will need to operate across network boundaries and between networks in different regulatory domains where different overall solutions may exist for number portability.

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## 5 Introduction

Generally, a directory number is considered to be ported when a major change occurs to the subscription of a customer, but the customer retains their assigned number(s). Depending on the kind of subscription change the following types of number portability can be identified:

- service portability;
- service Provider portability;
- location portability.

From the customers point of view all three types of number portability are desirable because a change of directory number(s) is usually linked with considerable inconvenience and expense.

In principle, the technical issues are the same for all types of number portability, but there are some differences. For example, location portability and service portability may be implemented within one operator's network domain - whereas Service Provider portability requires inter-network specifications and agreements.

It is possible to combine the types of number portability, but this maybe subject to regulatory approval and is outside the scope of the study of which the present document is part.

### 5.1 Location portability

Location Portability is only applicable to geographic numbers, as by their nature, non geographic numbers do not incorporate location information. Unless combined with other types of portability, location portability is an internal network operator matter.

Different scopes of location portability result in varying levels of complexity:

- porting within an exchange area and within a charging area impacts neither network routing nor billing;
- porting within an exchange area but outside the charging area has implications for billing but not for network routing;
- porting outside the exchange area but within the charging area impacts network routing but not billing. This is only the case where operators have common charging areas; if they do not, the forth bullet applies;
- porting outside the exchange and charging area has implications for both routing and billing.

Geographic Numbers represent those numbers that imply the provision of a service to a specific geographic area and can be analysed by the calling party to determine the tariff. Operators generally allocate geographic numbers for PSTN/ISDN service (domestic and business) and according to the topology of their network. These numbers are generally allocated in blocks (e.g. 10,000 numbers) to individual local exchanges within a specific charge area. Thus limited location portability may be possible within these constraints; there is a need, however, to consider the implications of subsequent porting.

Billing is impacted where the significant digits of the ported number no longer give an accurate reflection of the location of the terminal/customer for charging purposes. Routing can be impacted, because the significant digits of the ported number can no longer be used to identify the exchange on which the number is hosted.

Provision of location portability is beyond the scope of the present document.

### 5.2 Service portability

Service portability is a network operator option to provide additional features of a network operator's service portfolio. Consideration should be given to charging implications, e.g. a freephone number should not be ported to a premium rate service, unless some warning is given to callers of additional charges.

Service portability is beyond the scope of the present document.

## 5.3 Service provider portability

Service Provider Portability may be provided for geographic numbers and for non-geographic numbers, and allows customers to change Service Provider whilst retaining the same number. The present document concentrates on this type of portability.

## 5.4 Concatenation of types of number portability

Concatenation of types of portability can have implications if the customer wishes to revert to the original set-up; e.g. Service Provider portability followed by location portability may make it impossible for the customer to revert to the original donor Service Provider, as the donor may not offer location portability to the extent of the domain of that offered by the recipient Service Provider (i.e. it is not possible to move so far in the donor provider hence it is impossible to revert service).

Table 1 shows the applicability of each type of portability to each type of number range.

**Table 1: Applicability of type of portability**

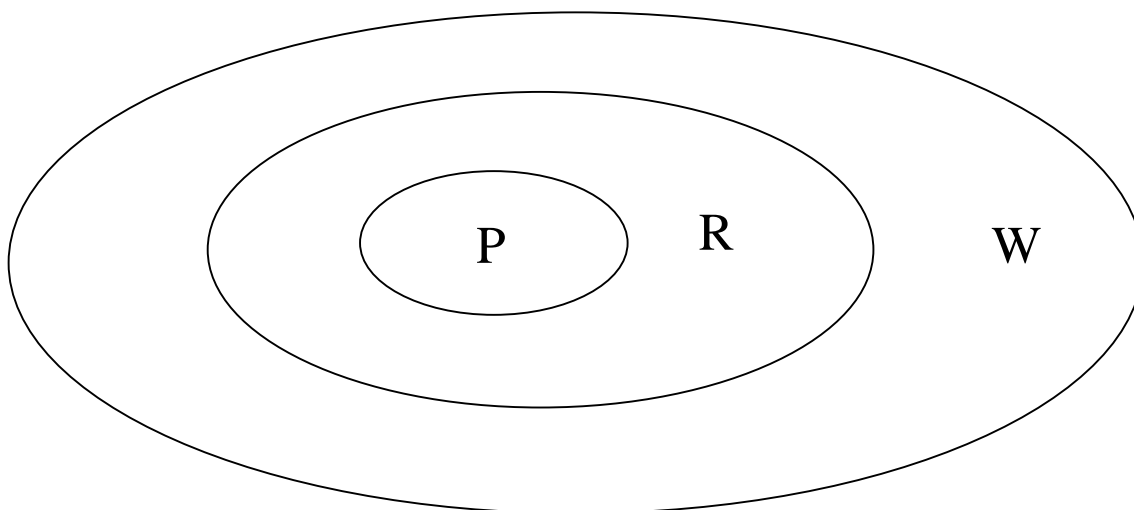
Type of Portability	Number Ranges		
	1	2	3
Type of Portability	Geographic	Non-Geographic	Mobile
Operator or Service Provider	√	√	√
Location	Restricted, depending upon network configuration and tariffing (notes 1 and 2)	Not applicable note 3	Not applicable note 3
Service	√ (note 4)	√ (note 4)	√ (note 4)
<p>The following should be noted:</p> <p>NOTE 1: See previous text on location portability.</p> <p>NOTE 2: Location Portability can be provided by an operator as a service in its own right, e.g. call forwarding.</p> <p>NOTE 3: Location portability is not relevant to services that have no geographic significance.</p> <p>NOTE 4: Allowed only if tariffing and regulatory constraints are met.</p>			

## 5.5 Number portability domains

When examining Number portability, it is instructive to consider the domains to which it applies. In addition to the portability domain, i.e. the scope of portability, there is another domain, the routing Domain, which describes that part of the network(s) that is able to recognize a number as ported, and route accordingly.

In figure 2, area 'P' is the domain over which it is possible to port a number, area 'R' is that part of the network that recognizes a number is ported, and carries out appropriate action (NB: for portability in the fixed network this routing domain could well include mobile networks). Domain W describes the rest of telecom network, that has no way of detecting a number is ported, and therefore should route using normal principles. For location and service portability, domain 'R' is likely to be the extent of a single operator's network.

For portability of national numbers domain 'R' is likely to be at most the national boundary. For portability of ETNS, domain 'P' will be the networks of all CEPT countries, and ideally domain 'R' should be of the same extent.



**Figure 2: Domains**

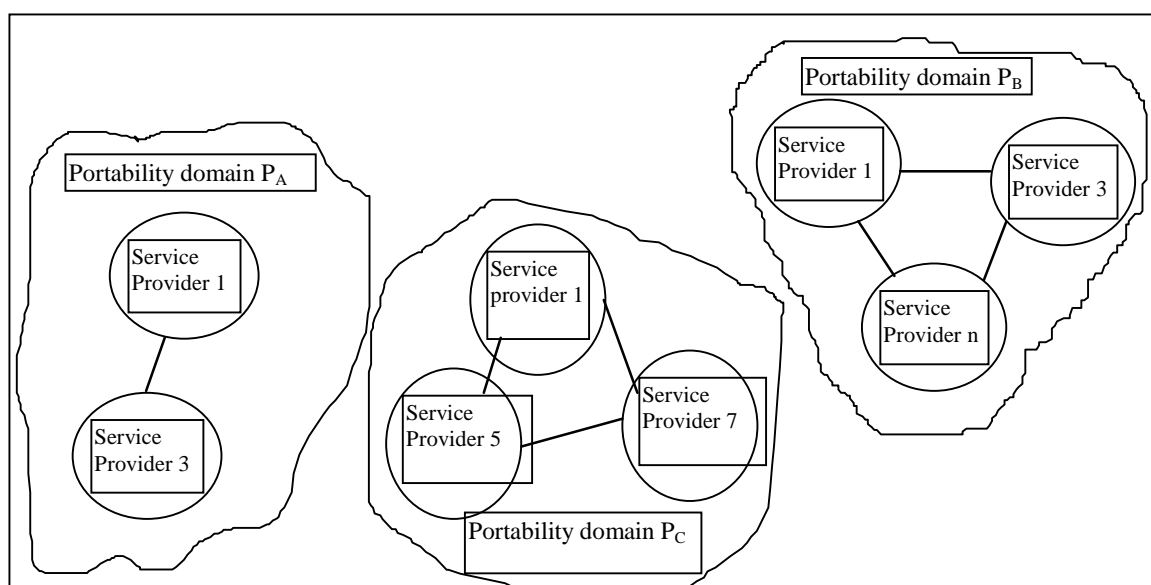
A DN can only be ported when certain restrictions are not overruled. These define the portability (p).

Example possibilities for the definitions of the portability domain could be:

- 1) a Geographical area (e.g. domain of a local exchange, an NDC or a country etc.), a user may only port the Directory Number if not moving outside the geographic area;
- 2) a Charging Zone, a user may only port the Directory Number if not moving outside the charging zone;
- 3) a user may only have their directory number ported if the type of telecommunication does not change, e.g. Freephone to premium rate, or telephone service (fixed) to mobile telephone service (PLMN).

From the above one can understand that one of the reasons for restricting NP to a NP domain could be to prevent a caller, originating a call to a ported number, from being charged other than it is indicated by the dialled number.

The Network scenario in figure 3 below gives an example of 3 portability domains, whereby a user can not port the directory number when moving between the domains.



**Figure 3: Principals associated with number portability domains**

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## 6 Overview of number portability

### 6.1 What is a number?

When number portability is discussed, number is taken to have the meanings defined in ITU-T Recommendation E.164.[4]

### 6.2 Generic assumptions for number portability

Solutions to support number portability should allow rapid deployment of number portability in such a manner that Service Providers can migrate between technical solutions. Solutions should be developed such that technology should not be presented as a barrier to implementing number portability.

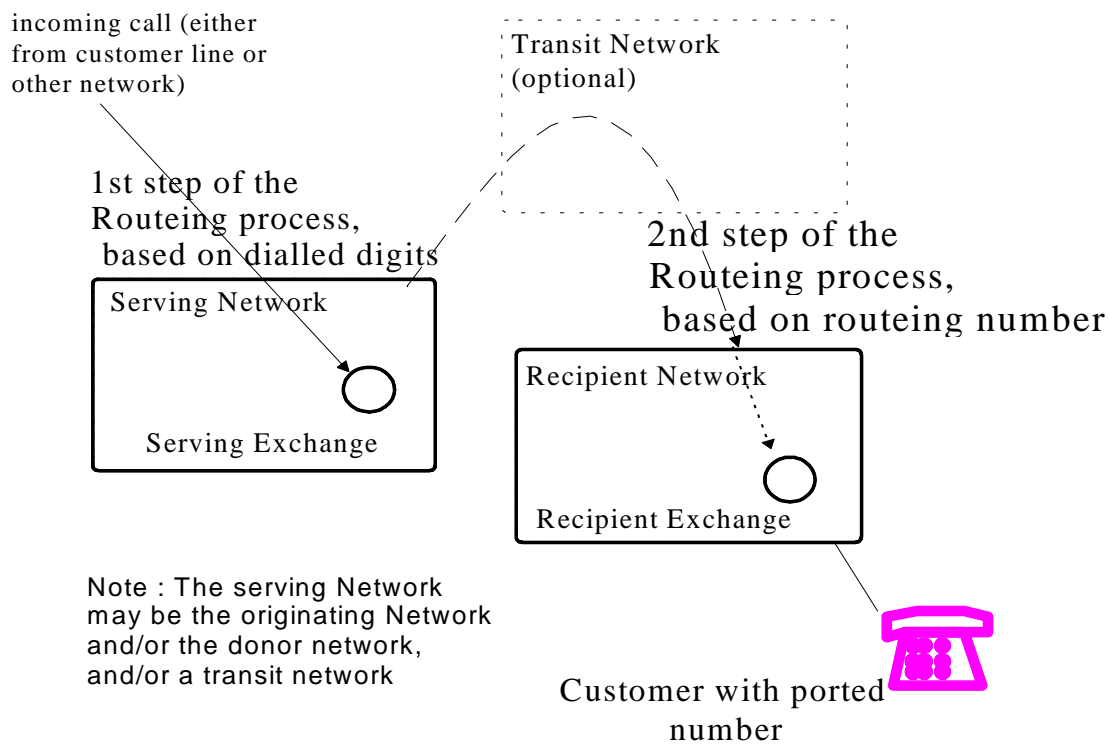
Each operator decides about their own network architecture, network functions and design of internal interfaces, as long as external requirements are fulfilled.

This subclause lists some general requirements and limitations related to the number portability. In some cases (e.g. privacy) the requirements and the limitations are partially in conflict.

- 1) Only the ITU-T Recommendation E.164 [4] number (not including prefixes, suffixes, etc.) should be considered eligible to be ported.
- 2) The entire ITU-T Recommendation E.164 [4] number and not only part of it should be ported.
- 3) In some case not a single ITU-T Recommendation E.164 [4] number but a collection of ITU-T Recommendation E.164 [4] numbers may be requested to be ported
- 4) The privacy of the user which has ported his/her number should be granted. That means that the calling party should not be informed that the called party has ported his number.
- 5) Number portability should not affect the call dialling procedures.
- 6) When line identity presentation is required it shall be the directory number.
- 7) Introducing Service Provider portability should not adversely affect conformance with national or international propagation and echo standards.
- 8) Ensure that the preferred solutions are compatible with one another and provides a migration path between introductory solutions and long term solutions.

### 6.3 How is number portability generically performed

A number of entities are involved when describing number portability. The responsibilities of these entities are described more fully in clause 7. The information concerning number portability is transmitted between these entities by means of a routing number.



**Figure 4 Conceptual Framework for Incoming Calls**

The routing number associated with a ported call has a structure associated with it.

Looking at the information contained in the Routing number TR 101 073 [5], 2 different cases can be identified: Complete Routing Number (CRN) and Partial Routing Number (PRN).

In case of portability for geographic numbers Complete Routing Number means that the Routing Number got by the Serving exchange contains enough information to route the call to the Recipient Exchange. Likewise Partial Routing Number means that the Routing Number obtained by the Serving Exchange does not contain enough information to route the call to the Recipient Exchange. That implies the need of subsequent translations that may take place in the Transit Network or in the Recipient Network to get the Routing information to complete the call.

In case of portability for non-geographic numbers the distinction between Complete Routing Number and Partial Routing Number is less important. In fact the Routing number obtained by the Serving Exchange has to identify not a specific exchange but only the Service Provider who is responsible for the provision of the service associated with the non-geographic number. In this case we can assume that the Routing number is always a Complete Routing Number that is the Service Provider can be identified without subsequent translations.

## 6.4 Implications of number portability

The Numbering Plan Administrators allocates numbers in blocks, and routing for the connection oriented services and non circuit signalling related services (e.g. CCBS) is based on these numbers. Number Portability breaks down this relationship based on these blocks.

When customers are allowed to port their directory number between operators, the number of customers per number series in a given exchange becomes much lower than previously since the total number of connected customers to a particular number series will then be shared by a number of exchanges and operators.

Another effect of number portability is that the same number series (e.g. 10,000 block of customer numbers) will now exist in many exchanges. With location portability this means that after a time all number series in the portability domain could exist in all local exchanges serving this domain.

A third effect of number portability is that one particular exchange will need to maintain many more number series than previously; this is to support the same number of customers connected, due to the lower number of customers per number series.

Implementing number portability has operation and maintenance implications for operators. Procedures are required to support operators perform number portability. These procedures could include:

Process Activity	Steps to be covered
Service Establishment	Initial Contact Planning Stage Implementation Planning Network Implementation and Testing
Service Maintenance	introduction of a new switch introduction of a new number block number change new routing number
Service Ordering	Requests, validation, scheduling, contingency plans, hours, subsequent mobility, change of account name, reasons for rejection Installation Cancellation
Fault and repair handling Directory Number Information	Directory entries, operator assistance emergency service
Billing	

The introduction of number portability will have implications for the administration of numbers by the NPA in-order to support the procedures and process stated above.

The perceived implication will depend upon regulatory decisions and how the numbers are allocated i.e. on block or individually.

## 7 Responsibilities

### 7.1 General

A Service Provider acting as a recipient Service Provider, should be able to reciprocate, i.e. the same Service Provider should be able to act as a donor Service Provider. The mechanism by which an Service Provider supports number portability is the responsibility of the Service Provider. However all Service Providers shall have the following responsibilities placed upon them:

- service Providers should keep audible records, for example to be able to locate the ported customer for malicious call intercept;
- a Service Provider is responsible for their own customer base. However procedures need to be in place between the recipient, and the donor Service Provider to ensure effective and timely responses to customers;
- escalation procedures need to be in place. The exact nature of these processes need to be documented in the interconnect agreement of the Service Providers concerned;
- collecting and exchanging data necessary to support accounting should be accomplished.

Where number ranges are assigned to Service Providers, the donor Service Provider will receive the number back from the recipient Service Provider when the customer:

- relinquishes the number, e.g. moves outside the original number area(if this is not allowed), or ceases to be an active service customer.

When a customer seeks to port their number a second time, creating a chain of donor Service Providers shall not occur.



## 7.2 Service provider portability of geographic numbers

### 7.2.1 Network operator responsibilities

In this subclause the responsibilities to route a call to the ported number are described.

#### Originating Network

The Originating Network is the network where the call is originated. It should be noted, however, that for the purposes of the present document, where carrier selection is employed, the selected carriers network becomes the Originating Network. Hence the network to which the caller is directly connected shall not perform any Number Portability Function.

The originating network could also be the Recipient Network or a Serving Network, in which case routing functions as described in the relevant subclauses below should be carried out. Otherwise, the Range Analysis Function should be carried out to route the call towards the Donor Network, possibly via a Transit Network.

#### Transit Network

The Transit Network should carry the call between two other networks. The Transit Network may or may not be acting as a Serving Network; if it is, it should carry out functions as described in the Serving Network section. If it is not, the Transit Network should:

- *if there is a routing number previously added by another network*, carry out the Range Analysis Function on this routing number to route the call towards the recipient network (possibly via another Transit Network);
- *if no routing number has been previously added*, carry out the Range Analysis Function on the called party number to route the call towards the donor network (possibly via another Transit Network).

#### Donor Network

There are no specific requirements of the Donor Network, unless it is acting as a Serving Network.

#### Recipient Network

The Recipient Network should use the routing number to route the call to the ported customer line; this could either be directly using the Range Analysis function for the routing number, or by use of the Database Query function.

#### Serving Network

The Serving Network Functionality may be split across multiple networks, and may reside in the Originating, Transit or Donor network. The following functionality should be carried out:

- the Call Trap Functionality should be carried out to determine that a number may be ported. This could be carried out by identifying a range containing ported numbers, or be specifically for a ported number;
- the Database Query Function should be carried out to determine a routing number;
- the Routing number addition function is added;
- the Range Analysis Function should be carried out on the routing number to direct the call towards the Recipient Network (possibly via a Transit Network).

### 7.2.2 Service provider responsibilities

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

#### Donor Service Provider

The donor Service Provider should not reallocate ported numbers to another customer.

When evolution changes in the number plan affects a ported number, the effects should be specified in the interconnect agreement.

### Recipient Service Provider

When evolution changes in the number plan affects a ported number, a migration path needs to be agreed with the entities involved. The entities involved depends upon the specific implementation. The recipient Service Provider will inform the donor Service Provider of a change of circumstances that may affect calls being delivered to a ported number.

A recipient Service Provider will ensure that a customer should not experience any limitations in the service offered by a Service Provider whether his/her number is ported or not. While the exact nature of the service offered to a ported customer is a commercial matter to be decided upon by the recipient Service Provider, if the recipient Service Provider offers a similar service to customers who have not ported their number, then they should have the ability to offer the same functionality, irrespective of whether the number has been ported or not, if the Service Provider wishes.

Customers will get access to the services determined by the Service Provider to whom they are connected, irrespective of whether their number has been ported or not.

The Recipient Service Provider has to provide sufficient information on outgoing calls such that the actual physical line being used, e.g. to enable Malicious Call Identification to occur.

## 7.3 Service provider portability of non geographic numbers

### 7.3.1 Network operator responsibilities

In this subclause the responsibilities to route a call to the ported number are described.

#### Originating Network

The Originating Network is the network where the call is originated. It should be noted, however, that for the purposes of the present document, where carrier selection is employed, the selected carrier's network becomes the Originating Network.

The originating network could also be the Recipient Network or a Serving Network, in which case routing functions as described in the relevant subclauses below should be carried out. If non geographic numbers are allocated by the NPA to users instead of Service Providers, the originating network may (also) be a serving network, or have a transit network acting as a serving network on its behalf. Otherwise, the Range Analysis Function should be carried out to route the call towards a Serving Network, possibly via a Transit Network.

#### Transit Network

The Transit Network should carry the call between two other networks. The Transit Network may or may not be acting as a Serving Network; if it is, it should carry out functions as described in the Serving Network section. If it is not, the Transit Network should:

- *if a routing number has previously been added by another network*, carry out the Range Analysis Function on this routing number to route the call towards the Recipient Network (possibly via another Transit Network);
- *if no routing number has been previously added*, carry out the Range Analysis Function on the called party number to route the call towards a Serving Network (possibly via another Transit Network).

### Donor Network

A donor network is only involved in NGNP if the NPA assigns number ranges to particular Service Providers, hence networks. In these cases the donor network can act as the serving network.

### Recipient Network

The Recipient Network should use either the routeing number or the non geographic number to execute the service logic function and thus provide the customer service. As an option the number translation function is not carried out by the recipient network, rather it is carried out by the serving network based on information received from the recipient network

### Serving Network

The Serving Network should carry out functionality as follows:

- the Call Trap Function should be carried out to determine that a number may be ported;
- the Database Query Function should be carried out to determine a routeing number;
- the Routeing Number addition function is carried out;
- the Range Analysis Function should be carried out on the routeing number to direct the call towards the Recipient Network (possibly via a transit network).

The serving network functionality may be split across various networks.

## 7.3.2 Service Provider Responsibilities

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

### Donor Service Provider

The donor Service Provider should not reallocate ported numbers to another customer.

When evolution changes in the number plan affects a ported number, the effects should be specified in the interconnect agreement.

### Recipient Service Provider

When evolution changes in the number plan affects a ported number, a migration path needs to be agreed with the entities involved. The entities involved depends upon the specific implementation. The recipient Service Provider will inform the donor Service Provider of a change of circumstances that may affect calls being delivered to a ported number.

A recipient Service Provider will ensure that a customer should not experience any limitations in the service offered by an operator whether his/her number is ported or not. While the exact nature of the service offered to a ported customer is a commercial matter to be decided upon by the recipient operator, if the recipient operator offers a similar service to customers who have not ported their number, then they should have the ability to offer the same functionality, irrespective of whether the number has been ported or not, if the Service Provider wishes.

Customers will get access to the services determined by the Service Provider to whom they are connected, irrespective of whether their number has been ported or not.

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## 8 Number portability for ETNS services

The new emerging market developments and the Commission of the European Union (CEU) are determining new requirements on the numbering of telecommunication services. One of the most important requirements is the creation (in parallel to the present national numbering plans) of ETNS to provide ETNS services.

The ETNS is planned to be implemented by using an additional country code (388) reserved for ETNS services.

The European Number (EN) is not directly usable to get the physical location of the called party.

When an ETNS call is set up usually two number translations are required. The ETNS call is routed to the concerned ETNS Translation database where the EN is translated into a Routeing number which contains the identity of the next translation database. The second translation is made by a Service Provider Translation database before the call reaches its final destination.

When the European number is ported from the donor Service Provider to the recipient Service Provider a change of Service Provider implies a new Routeing number. Therefore the changing of Service Providers impacts on the Routeing number associated to the EN. As such portability of Pan European Numbers is a special case of NGNP, where the routeing number is internationally significant.

The portability of European numbers impacts on the management of the ETNS resource. In particular the Registrar that is responsible for the handling of the Subscriber Number plays an important role in the management of the ported European numbers. The Registrar should keep track of the status of the European Numbers allocated to the various Service Providers and then document whether a number has been ported or not.

From the management point of view when an EN number is ported from the donor Service Provider to the recipient Service Provider some actions take place between the two Service Providers and the Registrar. These actions can be summarized in three steps:

- 1) the Recipient SP has the responsibility to inform the Registrar that he has acquired a new customer with a ported EN;
- 2) the Registrar should keep track that the EN indicated by the Recipient Service Provider is now a EN ported number from the donor Service Provider to the recipient Service Provider ;
- 3) the Registrar should de-allocate the ported EN from the Donor Service Provider.

The interactions above described between the SPs and the Registrar may take a certain amount of time especially in the first phase where these interactions will not be fully automatic. The use of non-automatic interactions based on the involvement of human operators may affect in a negative way the quality of the service offered to the customers of ETNS services. For example when the customer moves from SP A to SP B it is possible to have a period of time where the service is not available due to the allocation/de-allocation procedures of the ported European number.

Two possibilities exist for the distribution of the routeing numbers to the ETNS Translation Database.

The first possibility is the Service Provider informs the Registrar of the Routeing Number associated to the EN. The Registrar is responsible to distribute this information to the relevant ETNS translation database(s); this is the centralized approach.

The second possibility is that the Service Provider has the responsibility to distribute the Routeing Number associated to the EN to the relevant ETNS Translation Database(s); this is the distributed approach.

The location and the number of the ETNS Translation databases for a specific pan-European service depends on the Routeing methodology chosen to route the ETNS call. The alternatives vary from one single ETNS Translation database to a number of ETNS Translation databases (one in each European network from where an ETNS call is originated).

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## 9 Impact on other services

Number Portability shall not inhibit support of PSTN and ISDN services. This ideally includes the TC based services, e.g. CCBS and MW.

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## 10 Quality of Service

The object of this clause is to specify the quality of service encountered by the user.

When a number is ported, additional times are incurred that may degrade performance. Two elements combine to create the additional time; these are the 'look up time' and 'subsequent connect time'.

The interconnect agreement needs to:

- apportion the times for these delays to each of the operators involved;
- specify from when the timings start.

In discussing the apportionment of the timings to the operators care needs to be taken which operator performs which function. Also the interconnect agreement needs to take account of the legacy systems available, recognizing that existing technology should not be a barrier to implementing Number Portability. The goal of any interconnect agreement should be to ensure that the combined additional delay should not exceed 1 second. Where this can not be currently met, then plans should be made to improve the existing times associated with the Service Providers such that the Post Dial Delay to a ported number should be no more than 1 second compared to a call to a non ported number.

Incoming calls to a ported number should not suffer undue loss of quality of service.

ETSI can play an important role in addressing these quality of service issues, by discussing the issues that arise, and by contributing to the European Interconnect Forum (EIF), which is taking the European lead on this issue.

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## History

<b>Document history</b>		
V1.1.1	November 1997	Publication