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Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Number portability and its implications for TIPHON networks

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Technical Report

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Foreword

This Technical Report (TR) has been produced by ETSI Project Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON).

Introduction

The present document provides a general introduction to number portability and identifies various issues that need to be considered by the designers of TIPHON networks. The present document is co-ordinated with the main ETSI publications on number portability.

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1 Scope

The present document gives an introduction to number portability and an overview of the current way in which number portability is being implemented in various countries. The objective of the present document is to inform the designers of Tiphon equipment and the implementers of Tiphon networks about:

- the various requirements that they may have to comply with in different countries;
- the implications for equipment and network design.

The present document concentrates on the actual implementations which have been developed rather than the descriptions given in other standardization documents because:

- the standardization work has been too late to influence many implementations;
- the objective is to help Tiphon networks fit into existing situations.

The present document focuses on the technical implementations. National strategies, responsibilities and charging are covered only to the extent necessary to outline the context for the technical solutions.

The present document gives most emphasis to number portability of national numbers in fixed networks; as such, portability of numbers for Global Services and for European Telephony Numbering Space (ETNS) numbers is not considered.

The present document is complementary to other deliverables on number portability produced by ETSI.

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2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

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- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, 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] ETSI TR 101 119 (V1.1.1): "Network Aspects (NA); High level description of number portability".

[2] ETSI TR 101 122 (V1.1.1): "Network Aspects (NA); Numbering and addressing for Number Portability".

[3] ETSI TR 101 118 (V1.1.1): "Network Aspects (NA); High level network architecture and solutions to support number portability".

[4] ETSI TR 101 697 (V1.1.1): "Number Portability Task Force (NPTF); Guidance on choice of network solutions for service provider portability for geographic and non-geographic numbers".

[5] ETSI EG 201 367 (V1.1.1): "Intelligent Network (IN); Number Portability Task Force (NPTF); IN and Intelligence Support for Service Provider Number Portability".

[6] ETSI TR 101 698 (V1.1.1): "Number Portability Task Force (NPTF); Administrative support of service provider portability for geographic and non-geographic numbers".

[7] Directive 97/33/EC of the European Parliament and of the Council of 30 June 1997 on interconnection in Telecommunications with regard to ensuring universal service and interoperability through application of the principles of Open Network Provision (ONP).

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[8] Directive 98/61/EC of the European Parliament and of the Council of 24 September 1998 amending Directive 97/33/EC with regard to operator number portability and carrier pre-selection.

[9] ITU-T Recommendation Q.931: "ISDN user-network interface layer 3 specification for basic call control".

[10] ITU-T Recommendation Q.769.1: "Signalling system No. 7 - ISDN user part enhancements for the support of number portability".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

donor network: initial network where a number was allocated by the numbering plan administration before ever being ported.

network routeing number: number that is derived and used by the network to route the call towards a ported number.

operator portability / service provider portability: where a customer changes network/service provider (without changing location) and keeps the same directory number.

originating network: network where the calling party is connected.

location portability: where a customer changes location (without changing network provider) and keeps the same directory number.

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recipient network: network where a number is located after being ported.

service portability: where a customer changes service (without changing network provider or location) and keeps the same directory number.

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transit network: network between two networks, e.g. . the recipient network and the donor network.

3.2 Abbreviations

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

ACQ	All Call Query
FCC	Federal Communications Commission (US)
IN	Intelligent Network
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
NOA	Nature Of Address
PSTN	Public Switched Telephone Network
QoR	Query on Release
SCN	Switched Circuit Networks
SIP	Session Initiation Protocol
ToN	Type of Number

4 Introductory overview

4.1 Types of number portability

Number portability is the ability for a customer to keep his directory number when changing his telecom network connection. Three types of number portability are often distinguished:

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- **Operator portability** - where a customer changes network provider (without changing location) and keeps the same directory number.
- **Location portability** - where a customer changes location (without changing network provider) and keeps the same directory number.
- **Service portability** - where a customer changes service (without changing network provider or location) and keeps the same directory number.

These types may be combined. For example it may be possible to change operator and location while keeping the same number. In all cases, however, the fundamental objective is to spare customers the considerable inconvenience and/or cost of a number change, while enabling them to benefit from competition and service upgrades, or to minimize the disruption of a physical move.

4.2 National strategies

Many countries develop a national strategy on number portability. This strategy consists (ideally) of:

- A statement of the scope and requirements for number portability;
- Routeing rules and rules for the exchange of information;
- Charging rules;
- A definition of the role of an independent third party e.g. the operator of a national database (if needed);
- Implementation timescales;

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and is developed through a process of consultation between the regulator and the operators. In forming the strategy, choices have to be made between the objectives of promoting competition and of promoting wider user interests, including benefits from competition.

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An important issue is the extent to which the national strategy should define the technical solution to be used. Those countries that started first to develop number portability focused on the choice of technical solution to be implemented by all operators. Since then the trend has been to define the strategy by defining the responsibilities for routeing and charging and allowing the operators freedom to make their own decisions on the technology. This has the advantage that operators can:

- change their technical solution when it is cost effective to do so,
- use facilities provided by other operators, and
- take full account of possibilities for sharing facilities with other network functions, e.g. sharing IN capabilities.

For example:

- a basic technical strategy would define whether operators should use IN or data decode (re-routeing using number analysis in switch processors). It would define the charging separately.
- a more flexible strategy would define which operator has responsibility for routeing and what payments may be made and would allow operators to choose who does the routeing and what technology they use.

4.3 Consumer protection principles

Although competitive considerations often become dominant, the basic motive for introducing number portability is customer benefit. To ensure continuing consumer protection, most regulators have followed two basic principles:

- Callers should not face unexpected charges. This means that number portability should not reduce the tariff information that can be deduced easily from the number.
- Customers should retain full choice. This (together with competitive considerations) means that number portability between operators should be fully reciprocal. In other words, a number once ported should always be

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able to be returned to its original operator and location. This rule should apply even where a chain of multiple portings has been undertaken.

Using these principles, regulators around the world have typically restricted the scope of number portability as follows:

- **Location portability** is typically restricted to the zone in which neither the price of calls nor the geographical significance of the telephone number is altered (i.e. normally, within a charging area at most).

- **Service portability** is typically restricted to similar service types. So, for example, fixed number portability might include the transfer of a number from an ISDN service to a PSTN service; and mobile number portability might include the transfer of a number from an analogue to a digital service. However, full number portability between service categories is not normally allowed, as it would remove key tariff, location and service information from the number. For example, portability between freephone and premium rate services would destroy the utility of either service.

4.4 Main applications of number portability

In practice there are three main applications for number portability:

- **Geographic number portability** refers to portability in the fixed geographic networks - the Public Switched Telephone Network (PSTN) and Integrated Services Digital Network (ISDN). It is primarily concerned at present with operator portability, but may include limited location portability and service portability. For example it may be possible to have location portability in the area served by the number block from which the number has been allocated, or in the whole local charge area. Longer term, with less distance-dependent tariffs, there may be wider location portability. Fixed number portability may also include an element of service portability, for example transfers from PSTN to ISDN;

- **Mobile number portability** refers to the transfer of numbers between mobile operators or service providers. It may also include service upgrade, for example from analogue to digital service;

- **Non-geographic number portability** refers to the transfer of numbers between operators or service providers of fixed non-geographic services. These services are ones where the directory number does not contain any information about the geographic location of the customer. They include freephone services (typically using the number prefix 800), shared cost services, and premium rate services.

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Table 1 shows the relationships of the types and applications of number portability.

Table 1: Relationship of types and applications of portability

	Fixed	Mobile	Non-geographic
Operator	Applicable	Applicable	Applicable
Location	Applicable	Not applicable	Not applicable
Service	Applicable	Applicable to service upgrades	Not applicable

As the telecommunications market becomes fully liberalized, there may no longer be a direct relationship between a network operator and a customer. Instead there may be a multi-layer supply chain, which may feature service providers and resellers as well as the network operator. In this environment, the full benefits of number portability will only be obtained if it is applicable to every link in the service provision chain. This may be achieved by:

- placing requirements on service provision, or

- placing requirements on the network operators, together with an insistence that this obligation be reflected in contracts placed with service providers along the service provision chain.

This choice is influenced by the structure of the national legislation for telecommunications.

4.5 Number portability and personal numbering

Number portability is sometimes confused with the concept of "personal numbering" (a general description that includes the Universal Personal Telecommunications service). Personal number services enable users to register their presence at any terminal on any network. Once registered, the customer can make and receive calls to that terminal.

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Outgoing calls would be billed to the personal number account regardless of originating terminal. There are four key differences between personal numbers and number portability.

- Personal numbering is a service whereas number portability is a feature of an existing service.
- Personal numbering requires the customer to have a new number in addition to the customer's existing numbers, enabling use of the personal number across a range of different network numbers without porting these network numbers. Number portability does not require a number change.
- Personal numbering routes calls to the customer, regardless of the physical network address of the terminal being used. Calls to a ported number are routed to a given physical network address regardless of the actual location of the customer.
- Personal numbering uses a temporary association between the personal number and the telephone number of the terminal to which a call is directed. With number portability, this association is semi-permanent.

Personal numbering is therefore not a substitute for number portability and does not address the competition and user related issues addressed by number portability. Depending on the method of allocation, personal numbers may be related to particular providers of personal numbering services, in which case the personal numbers themselves should be portable.

4.6 Number allocation

The method of number allocation interacts with the solution for number portability. For fixed services, numbers are currently normally allocated in blocks to each network operator and the operator allocates the individual numbers to the subscriber. With competing operators, allocations of blocks are normally made within the existing geographical structure in order to maintain the geographical information in numbers that users have learned.

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Allocation through network operators means that the number indicates the operator to which the block allocation was made, even if the number is ported subsequently. This operator is the initial donor if the number is ported. Because of the allocations in blocks, the operator is called the "block" operator.

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With block allocation, routeing needs only to examine the number to the depth of the block. In the longer term, users may prefer direct allocations of numbers that are independent of the operators. This implies that there would no longer be a "block" operator and that more detailed number analysis would be needed, increasing the need for IN. Direct allocation is already being used for non-geographic services in a few countries, and to improve the efficiency of use North America is planning allocations at levels below the normal block (called number pooling). The introduction of individual allocation is quite a major undertaking, requiring:

- a mechanism for allocating numbers to individuals
- a national reference database
- modified billing and support systems
- modified routeing methods, probably by introducing widespread use of IN

The examination below of fixed number portability assumes block allocation that follows the existing geographical structure.

4.7 Number portability in Europe and the USA

Number portability has been seen in Europe and the USA primarily as a stimulus to competition and the emphasis has been on operator portability.

The European Commission has addressed number portability in:

- the November 1996 Green Paper on a Numbering Policy
- the Interconnection Directive (97/33/EC [7]) followed by a specific Directive on Number Portability and carrier selection (98/61/EC [8]), which requires fixed and non-geographic number portability to be implemented by 1 January 2000 so that subscribers may choose to port their numbers. This means that all operators, including new entrants, have to implement portability.