



Electronic Communications Committee (ECC)
within the European Conference of Postal and Telecommunications Administrations (CEPT)

**IMPLEMENTATION OF
MOBILE NUMBER PORTABILITY
IN CEPT COUNTRIES**

Updated: October 2005

(Original report: March 2003)

0 PREFACE FOR THE UPDATED REPORT VERSION

ECC Working Group Numbering, Naming and Addressing (WG NNA) decided at its meeting in Malta on 3-4 May 2005 to update the ECC Report 31 "Implementation of Mobile Number Portability in CEPT Countries". The task was carried out by the ERO in summer 2005. WG NNA members were asked to update their country specific data and also to send feedback in case of no changes were necessary in existing data in the original report.

This update (revision 1) does not form a *new* report but a revision to the ECC Report 31. The structure of the original ECC Report 31 (March 2003 version) is mainly kept unchanged. Naturally, the accuracy of the contents has been checked and updated accordingly. The actual changes are not highlighted in the report, but the original version will be kept available at the ERO web-site. The WG NNA approved this updated report at its meeting in Paris on 4-5 October 2005.

The 46 CEPT countries are:

Albania, Andorra, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, United Kingdom of Great Britain and Northern Ireland, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Monaco, Netherlands, Norway, Poland, Portugal, Former Yugoslav Republic of Macedonia, Romania, Russian Federation, San Marino, Serbia and Montenegro, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine and Vatican.

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1 INTRODUCTION

This updated report presents key experience of CEPT countries that have implemented mobile number portability or are planning its implementation. The main purpose of the report is to enable countries that are preparing for the introduction of mobile number portability to be aware of the predominant approaches to its implementation and to compare alternative approaches. The information provided in this report might also assist countries that have already introduced mobile number portability but wish to review aspects of its implementation.

Portability of various types of numbers is a fact in most liberalised telecommunications markets, and portability of mobile numbers is fast becoming more widespread. This may, in part, be due to arguments that the scale of the benefits from mobile number portability may be smaller than for portability of other types of numbers. If this is the case, the smaller benefits may be because, for many users, the ability to retain their mobile number when switching network is desirable but not critical, particularly when mobile phones are used only occasionally or predominately for outgoing calls. It may also be that the scope for efficiency gains through increased competition is lower in the mobile market because the rate of churn rate is generally relatively high even before portability is introduced.

If the benefits of portability of mobile numbers are relatively less substantial than for other types of numbers, then the success of mobile number portability is likely to depend on factors such as how simple and inexpensive the implementation of portability is, relative to the value users put on their numbers and the retention of them.

This updated report therefore also aims to provide information that points to ways in which mobile number portability can be implemented in the most cost-efficient manner.

The report summarises information collected in summer 2005 regarding implementation of mobile number portability or plans for its implementation.

2 BACKGROUND

Mobile telephones are an increasingly ubiquitous form of communication. In some cases, they have entirely replaced fixed telephones as the usual method of communication for residential or business users. This reflects the mobile penetration rates in many European countries, in which the trend is for the mobile penetration rate to exceed that of the fixed network. In EU countries, the average mobile penetration rate is greater than the fixed network penetration rate (see annex for estimated figures).

For users, therefore, it may seem logical that the capability for porting fixed network numbers has been extended to mobile numbers. Mobile number portability also creates for mobile users the benefit of something akin to a personal number, which enhances the concept of personal mobility that they already receive via the use of a personal terminal.

From a user's perspective, mobile number portability creates an ability to switch mobile network without the possible cost and inconvenience of a change of their telephone number. This is because, in the absence of number portability, a change of number when switching networks requires most users to notify people who contact them of the new number. In the case of business users, especially those who rely on a mobile phone as a primary method of communication, the effort and cost involved in notifying contacts of a new number may be quite substantial.

From a regulator's perspective, mobile number portability is intended to produce certain effects on the mobile market. Fundamentally, it should prevent network operators from gaining market power by charging an extra price margin that corresponds to the cost of switching networks. Consequently, mobile number portability should:

- Enhance competition among network operators, especially in relation to the installed subscriber base;
- Create downward pressure on prices; and
- Make it easier for newer entrants to gain market.

The European Union Directive on *universal service and users' rights relating to electronic communications networks and services* (Universal Service Directive) took effect in member states on 25 July 2003. Article 30 of the directive requires that:

Member States shall ensure that all subscribers of publicly available telephone services, including mobile services, who so request can retain their number(s) independently of the undertaking providing the service:

- (a) in the case of geographic numbers, at a specific location; and
- (b) in the case of non-geographic numbers, at any location.

3 SCOPE OF IMPLEMENTATION

Mobile number portability has, to date (August 2005), been implemented in the following CEPT countries:

| Country | Date of implementation |
|-----------------|---------------------------|
| Austria | 16 October 2004 |
| Belgium | September 2002 |
| Cyprus | July 2004 |
| Denmark | July 2001 |
| Estonia | 1 January 2005 |
| Finland | 25 July 2003 |
| France | 30 June 2003 |
| Germany | November 2002 |
| Greece | September 2003 |
| Hungary | 1 May 2004 |
| Iceland | 1 October 2004 |
| Ireland | 25 July 2003 |
| Italy | April 2002 |
| Lithuania | 1 January 2004 |
| Luxembourg | 1 February 2005 |
| Malta | 31 July 2005 ¹ |
| Netherlands | April 1999 |
| Norway | November 2001 |
| Portugal | January 2002 |
| Slovak Republic | 1 May 2004 |
| Spain | October 2000 |
| Sweden | September 2001 |
| Switzerland | March 2000 |
| United Kingdom | January 1999 |

Table 1: Dates of implementation of mobile number portability

1. With interim arrangements until 31 March 2006

Planning is underway in the following countries for implementation of mobile number portability:

| Country | Planned implementation date, if any |
|----------------|-------------------------------------|
| Croatia | 30 October 2005 |
| Czech Republic | 15 January 2006 |
| Poland | October 2005 |
| Romania | During 2007 |
| Slovenia | 31 December 2005 |

Table 2: Planning of mobile number portability

4 ROLE AND INVOLVEMENT OF REGULATOR

What is the appropriate role that should be assumed by the regulator in determining the approach to implementation of mobile number portability to be adopted in each country? Arguments for and against the regulator determining the approach to implementation are:

- Without involvement by the regulator, industry players will lack the initiative, or the means of reaching agreement, to settle on a particular method of implementation;
- The most cost-effective solution to a network operations problem such as implementation of mobile number portability will be most efficiently worked out by the industry players themselves.

CEPT countries vary regarding the extent of regulator involvement in determining how mobile number portability is implemented. Arguably the most important decision (other than apportionment of costs) to be made in preparation for implementation of mobile number portability is selecting the method to be used for routing calls made to a mobile number to the correct terminating mobile operator.

In many CEPT countries, network operators and other relevant parties have established a forum and process for making decisions collectively about mobile number portability implementation. In the absence of involvement by the regulator in determining the method to be used for routing calls and other important parameters of mobile number portability implementation, such a forum and process becomes essential and the effectiveness of it in reaching decisions quickly becomes critical. Even in those countries where the most critical decisions are taken by the regulator, however, it is clear that the involvement of industry in developing the detailed specifications for how mobile number portability will be introduced and will operate is vital.

5 CALL ROUTING

As mentioned above, a key question to be resolved early in the preparation for mobile number portability implementation is the method used for routing of calls from an originating network to the mobile network associated with a given mobile number. As with portability of other types of numbers, there are broadly two methods available for routing of calls in a mobile number portability environment:

- Routing of a call directly from the originating network to the correct terminating mobile network, which requires the former to determine what is the appropriate network for a given number (“ALL CALL QUERY”); or
- The mobile network that was originally associated with a given number is involved in the routing of a call to the correct terminating mobile network.

The second method can be further divided into several different forms:

- The mobile network originally associated with the called number identifies the correct terminating mobile network and routes the call onward to that network (“ONWARD ROUTING”);
- The mobile network originally associated with the called number checks if the number is ported and, if it is, releases the call back to the originating network together with information identifying the correct terminating network (“CALL DROP BACK”); or
- The mobile network originally associated with the called number identifies that the number is ported and returns a message to the originating network indicating that the number has moved. The originating network then queries a database to obtain information identifying the correct terminating network (“QUERY ON RELEASE”).

Onward routing is often regarded as the simplest routing method to implement and the all call query method as the most complex, with the other methods lying between these two extremes. This is also reflected in the costs of establishment, with onward routing regarded as cheaper to establish than the all call query method. By contrast, the ongoing costs associated with the all call query method are usually regarded as less than those of the onward routing method. Again, the costs associated with the other two methods lie between those of all call query and onward routing.

The methods used for routing a call to a ported mobile number that originates on:

- another mobile network (within the same country);
 - a fixed network (within the same country); or
 - a network in another country
- may be distinct. For calls to mobile numbers originating in another country, it is almost universally true that the foreign network will forward the calls initially to a correspondent network operator in the destination country, which will then route the call according to the same method it would use if the call originated on its own network.

It may not be necessary for all networks in a particular country to use the same method for routing of calls. Several countries have adopted approaches which permit network operators to choose the method of routing they will utilise.

The actual methods of routing calls to ported mobile numbers adopted in CEPT countries (or planned to be adopted) display considerable variation. Table 3 illustrates this variation across respondent countries and other CEPT countries for which information is available:

| Country | How calls are routed from a fixed network to a mobile network | How calls are routed from a mobile network to another mobile network |
|----------------|---|--|
| Austria | Onward routing or all call query | All call query |
| Belgium | All call query ¹ | All call query & query on release ¹ |
| Croatia | All call query | All call query |
| Cyprus | All call query ² | All call query |
| Denmark | All call query | All call query |
| Estonia | All call query | All call query |
| Finland | All call query (1.10.05-) | All call query |
| France | Phase 1: onward routing Phase 2: all call query | Phase 1: onward routing Phase 2: all call query |
| Germany | Onward routing & all call query | All call query |
| Hungary | All call query & query on release | Phase 1: all call query & query on release |
| Iceland | All call query | All call query |
| Ireland | Onward routing | All call query |
| Italy | All call query ² | All call query |
| Lithuania | All call query | All call query |
| Luxembourg | Onward routing | All call query |
| Malta | Onward routing but ACQ may also be used | All call query |
| Netherlands | All call query ³ | All call query ² |
| Norway | All call query | All call query |
| Poland | All call query | All call query |
| Portugal | All call query & query on release | All call query & query on release |
| Slovenia | All call query | All call query |
| Spain | Onward routing | Onward routing |
| Sweden | Onward routing & all call query | Onward routing & all call query |
| Switzerland | Onward routing | Onward routing |
| United Kingdom | Onward routing | Onward routing |

Table 3: Methods of routing calls to ported mobile numbers

1. The minimum legal requirement is for onward routing.
2. Queries could be outsourced to other operator.
3. Queries are outsourced by one operator to the incumbent operator.

SMS messages are routed between mobile networks via signalling paths rather than over voice circuits. This has two important implications:

- The methods used for routing of calls to ported numbers are not applicable to handling of SMS messages forwarded to ported numbers; and
- SMS traffic is generally only between mobile networks — SMS traffic between fixed and mobile networks is in its infancy — so routing of SMS messages to ported numbers does not yet need to take account of non-mobile networks.

There is as yet little information available on the methods used or planned to be used in CEPT countries for routing SMS to the correct mobile network.

6 NUMBER DATABASES

All implementations of mobile number portability involve the use of databases that contain information on the network with which ported numbers are associated. This information is used in routing a call to a ported number, to determine the correct terminating network for the call. The actual information is usually a routing number that can be used to enable a call to a ported number to be routed to the correct mobile terminating network.

Number databases are typically managed in either a centralised or a distributed manner. The centralised model involves a single reference database containing data for all mobile numbers (or for all ported numbers – it may not be considered necessary to store data for numbers that have not ported). It is usual for this reference data to be copied to operational databases in each participating network on a frequent basis. A centralised number database for mobile number portability is generally managed by a consortium of network operators, which may comprise just the mobile network operators or all network operators which may be involved in routing of calls to mobile numbers. The actual operation and maintenance of a centralised number database may be out-sourced to a third party company which has experience in database operations.

By contrast, the distributed model involves multiple databases containing subsets of the total data. Each separate database in the distributed model may, for example, comprise only the numbers assigned to a particular mobile network operator. The full set of information about all mobile numbers (or all ported mobile numbers) is only available from these separate databases when taken as a whole.

Most respondent countries (19 out of 23) have adopted or plan to adopt a centralised approach to management of a number database (see table 4).

| Country | Type of ported mobile number database |
|-------------|---------------------------------------|
| Austria | Distributed |
| Belgium | Centralised |
| Croatia | Centralised |
| Cyprus | Distributed ¹ |
| Denmark | Centralised |
| Estonia | Centralised |
| Finland | Centralised |
| France | Centralised |
| Germany | Centralised |
| Hungary | Centralised |
| Iceland | Centralised |
| Ireland | Centralised |
| Italy | Centralised |
| Lithuania | Centralised |
| Luxembourg | Centralised |
| Malta | Distributed |
| Netherlands | Hybrid distributed & centralised |
| Norway | Centralised |
| Portugal | Centralised |
| Poland | Centralised |
| Slovenia | Centralised |
| Sweden | Centralised |
| Switzerland | Centralised |

Table 4: Types of ported mobile number database

1. Operators are responsible to maintain their own database concerning all ported numbers or use another operator's database (incumbent's obligation) for routing their calls

7 ADMINISTRATION OF PORTING

Although the technical implementation of mobile number portability involves particular challenges, more attention has been given to the administrative arrangements that facilitate porting of numbers. There is a good awareness that poorly designed, complex or easily-abused procedures for porting of mobile numbers are less likely to result in a successful implementation of portability or to produce the benefits that portability is intended to deliver.

Nevertheless, designing efficient, simple and practical porting procedures for the mobile market involves special challenges not generally found in other forms of portability. These include the role of retailers, the need to change SIM-card, and the existence of contracts related to handset subsidies.

Other important factors in designing porting procedures apply as much to other forms of portability as to mobile number portability, and include the method by which the user requesting a port is verified as the holder of a number, arrangements for communication between entities involved in porting a number during the porting process, and procedures for porting large quantities of numbers at one time.

7.1 Entities handling porting Requests

Most mobile users deal exclusively with retail outlets in establishing their mobile service. Accordingly, it may seem natural for them to deal with retail outlets for porting their mobile number to a different operator, even though retailers may find it difficult to work with new and unfamiliar porting procedures. Table 5 summarises the entities handling porting requests.

Unless permitting particular market players to receive requests for porting of a mobile number creates particular problems, it makes sense to allow users the flexibility to approach various market players to request a port.

| Country | Request port from mobile dealers | Request port from mobile resellers | Request port from mobile operators |
|----------------|----------------------------------|------------------------------------|------------------------------------|
| Austria | X | X | X |
| Belgium | X | X | X |
| Croatia | X | X | X |
| Cyprus | X | X | X |
| Denmark | X | X | X |
| Estonia | | X | X |
| Finland | X | X | X |
| France | X | X | X |
| Germany | X | X | X |
| Hungary | X | X | X |
| Iceland | | | X |
| Ireland | X | | X |
| Italy | X | X | X |
| Lithuania | X | X | X |
| Luxembourg | | | X |
| Malta | X | X | X |
| Netherlands | X | X | X |
| Norway | X | X | X |
| Portugal | | | X |
| Slovenia | | | X |
| Sweden | X | X | X |
| Switzerland | X | X | X |
| United Kingdom | X | X | X |

Table 5: Entities from which port of mobile number may be requested

7.2 Porting procedures

Authentication

An authentication procedure is usually built into porting processes to ensure that the person requesting that a number be ported is authorised to do so. The way in which this is implemented can have significant effects on the robustness of the porting process, how convenient it is to users, and how long it takes to complete. The most important variables are:

- Whether authentication is performed via reference to account records, relies on some form of documentary evidence supplied by the person requesting the port (such as a bill), or uses some other technique;
- Who performs the authentication — for example, the entity that receives the porting request, or the donor network operator or service provider;
- How communication between the various parties which are involved in authentication occurs — for example, electronically, by fax, or by letter; and
- The level of trust between the various parties involved in a porting request, which itself may influence the need for an effective reversal procedure in the event that an unauthorised porting occurs.

A range of methods are in use or planned in 19 respondent countries, including:

- The donor operator verifies that the person requesting a port is the same as the assignee of the number mentioned in the request, frequently using the customer's account number as a key — this is most common method used;
- Similar customer identification methods are employed to those used when a new mobile service is established;
- The person requesting a port is asked to produce an identity card to authenticate their identity; and
- A call is made to the number to be ported to minimise risk of fraudulent requests.

| Country | Donor operator verifies port requests | Same authentication methods as for new services | Identity card supplied by person requesting port | Call made to ported number | Any method chosen by recipient operator |
|----------------|---------------------------------------|---|--|----------------------------|---|
| Austria | X | | X | | |
| Belgium | X ¹ | | | | |
| Cyprus | X | X | X | | |
| Denmark | X | | | | |
| Estonia | X | | | | |
| Finland | X | | | | |
| France | X | | | | |
| Germany | X | | | | |
| Hungary | X | | | | |
| Iceland | X | | | | |
| Ireland | X | | | | |
| Lithuania | X | | | | |
| Malta | X | | X | | |
| Netherlands | X | | | | |
| Norway | X | | | | |
| Portugal | | | X | | |
| Sweden | | | X | | |
| Switzerland | X | X ¹ | X ² | X ² | |
| United Kingdom | | | | | X |

Table 6: Methods of authentication

1. Recipient operator must provide power of attorney from subscriber to donor operator.
2. For numbers of prepaid contracts

The rigour of an authentication procedure may be related to the assessed risk of fraud, or to the capability to quickly reverse a port if it is found that it has fraudulently been requested.

Communications during porting process

Network operators and other entities involved in porting of a number have, in most countries, established special protocols or other arrangements for exchanging information during the porting process. In almost all countries, a dedicated communications network has been established or is planned to carry the messages associated with steps in the porting process. Such arrangements may ensure that messages are carried quickly and efficiently between entities involved in the porting process, that the risk of fraud is reduced, and that the specified porting procedures are correctly followed.

Refusal of port

In the majority of respondent countries, it is or will be permissible for a donor provider to refuse a port request. Grounds for refusal include:

- an incomplete porting request;
- the requesting party cannot be authenticated;
- two porting requests are received for the same number;
- the number is not associated with an active service provided by the donor;
- the term of the user's service contract is not complete – this is a very common ground for refusal;
- an outstanding debt is associated with the user's account;
- the user has a SIM-locked handset;
- the handset is recorded as stolen;
- national defence reasons; and
- technical obstacles.

The status of the refusal by a donor provider to port a number may differ according to whether the grounds for refusal are specified in regulation, or in the contract between an end user and the donor provider.

| Country | Term of service contract not complete | Outstanding debt | SIM-locked handset | Handset recorded as stolen | National defense reasons | Technical obstacles |
|----------------|---------------------------------------|------------------|--------------------|----------------------------|--------------------------|---------------------|
| Austria | | X ¹ | | | | |
| Croatia | X | X | X | X | X | X |
| Denmark | X | | | | | |
| Estonia | X | | | | | |
| Finland | X | | | | | |
| France | X | X | | | | |
| Germany | X | | | | | |
| Hungary | X | X | | | | |
| Iceland | | X | | | | |
| Ireland | | X | | X | | |
| Italy | | | | | | X |
| Lithuania | | | X | | X | X |
| Malta | | | | X | | |
| Netherlands | X | | | | | |
| Portugal | | | | | X | |
| Switzerland | X | | X | | | |
| United Kingdom | X | | | | | |

Table 7: Reasons for refusal of port

1. If the customer’s SIM-card has already been locked for outgoing calls

It seems reasonable for a donor network operator or service provider to be able to refuse a request to port a number under certain circumstances. It is, however, arguable that this ability should be carefully weighed against users’ legitimate rights over the use of their mobile numbers.

Time to port

A porting process that requires many days or weeks to port a number can seem very lengthy when compared with the few minutes or hours it may take for a user to initiate a new mobile service. A lengthy porting period may create extra costs for users in porting, or simply discourage them from porting at all. A short porting period, however, may allow insufficient time for proper checks at all stages of the porting process to avoid fraud and ensure proper completion of a port. It may also increase the costs of porting — for example, the costs associated with making a porting process available on a 24x7 basis.

The majority of respondent countries have instituted target periods within which porting of a number must be completed. There is enormous variation in the length of this period, which ranges from 2 hours to 30 days; the average target period is 7-8 days. There is no discernible trend regarding the length of the target porting period among CEPT countries, either towards the period becoming shorter or becoming longer. In fact, both the shortest and the longest target periods are in countries in which mobile number portability is currently in the planning stages.

| Country | Target maximum porting period |
|----------------|--|
| Austria | 3 working days |
| Belgium | 2 days ¹ |
| Croatia | 5 days |
| Cyprus | 14 days ³ |
| Estonia | 7 working days |
| Finland | 5 working days |
| France | 30 days |
| Germany | 4 working days + 2 further days |
| Hungary | 14 working days |
| Iceland | 10 days |
| Ireland | 2 hours single line / 8 hours multi line ports |
| Italy | 5 working days ¹ |
| Lithuania | 28 days |
| Malta | 4 hours ² |
| Netherlands | 10 working days |
| Norway | 7 days |
| Portugal | 5-20 working days |
| Slovenia | 5 working days |
| Sweden | 5 working days |
| Switzerland | 5 working days ¹ |
| United Kingdom | 2 working days + 1 calendar week ² |

Table 8: Target maximum porting period

1. Different period applies to complex ports.
2. Different period applies to bulk ports.
3. Practically is never more than 8 days.

The majority of respondent countries have restrictions on the time of day or week during which porting can occur. This may be to ensure resources can be devoted to the porting process during that time, or to avoid changes to operational systems during high-traffic periods. Such restrictions may reduce the costs of implementation — for example, allowing ports to be implemented during high-traffic periods might require more sophisticated modifications to operators' IT systems. It should, however, be recognised that such restrictions may reduce the flexibility of the porting process.

Bulk porting

There may be procedural advantages in managing the porting of large quantities of mobile numbers — for example, a “fleet” of corporate mobile telephones — via a separate procedure to that suited to porting of individual numbers. There may also be financial advantages in managing bulk ports via a special procedure as it may allow the cost of porting many numbers to be reduced significantly.

8 ECONOMIC ARRANGEMENTS

There are several categories of costs associated with implementing mobile number portability:

- The administrative cost each time that a number is ported;
- The establishment and operating costs associated with running a database containing details of ported numbers, whether that database is a centralised or a distributed one;
- The costs of additional conveyance of calls to ported numbers in the case that they must transit the mobile network originally associated with a ported number; and
- The costs of database dips in the case that this is required to determine the correct network to which a call must be routed.

The most critical question associated with these costs for regulators and industry players is how they are apportioned. A range of principles is taken into account in deciding how these costs will be apportioned, comprising:

- Cost causation — should the entity that generates a cost pay for it?
- Cost minimisation — how can incentives be created for all parties to minimise costs?
- Distribution of benefits — should the entities that benefit from mobile number portability pay its costs?
- Reciprocity — should cost apportionment be symmetrical?
- Effects on competition – how can any transactions or cost recovery approaches be certain of producing no adverse effects on competition (in particular, discouraging porting of numbers)?
- Efficiency — how can an outcome be achieved that creates the greatest level of efficiency in the allocation of resources?
- Practicality – how can a particular cost apportionment methodology be certain of being workable?

The practical choices available to regulators in deciding how to apportion a particular cost include:

- Imposing it entirely on the donor provider;
- Imposing it entirely on the recipient provider;
- Sharing it among the relevant market players;
- Allowing the relevant market providers to negotiate how the cost is apportioned;
- Requiring all market players to bear their own costs; or
- Imposing it on users.

Practices in CEPT countries regarding the various categories of cost associated with mobile number portability are described below.

Porting costs

The administrative process of porting a number involves various costs for the recipient network operator, the donor network operator, and potentially for mobile dealers or mobile resellers which may be involved in the porting process and for the operator of a number database.

The actual cost of a single port of a mobile number in the CEPT countries in which mobile number portability is implemented or planned and for which information is available range from 0 € up to 29 €; the average cost being 12,80 €.

| Country | Original announced costs | Costs in Euros (rates from 3 August 2005) |
|----------------|---|--|
| Belgium | Simple port 3,86 € Complex port 23,41 € Average 11,50 € | 11,50 € |
| Croatia | 5,30 € (recipient pays donor operator) | 5,30 € |
| Cyprus | 5,52 CYP | 9,7 € |
| Denmark | 72 DKK (tax excluded) | 9,65 € |
| Estonia | Not available | — |
| Finland | 10 € (about) | 10 € |
| France | 15,20 € | 15,20 € |
| Germany | 22,50 – 29,95 € Average 26 € | 26 € |
| Ireland | 20 € | 20 € |
| Italy | 10,02 € | 10,02 € |
| Lithuania | No fee | — |
| Netherlands | 23,89 € 10/100 block: 270 € 1.000/10.000 block: 1.783 € | 23,89 € |
| Norway | 10 € | 10 € |
| Portugal | 15 € | 15 € |
| Spain | No fee | — |
| Sweden | 36 SEK | 3,84 € |
| Switzerland | 29 CHF | 18,62 € |
| United Kingdom | 20 GBP (estimated, 1997 figure) | 29,04 € |

Table 9: Actual administrative costs per port

In virtually all countries, the administrative costs associated with porting a number are attributed to the recipient network. It is likely that this charge will be waived for many or most ports in order not to discourage the user from switching to the recipient's network.

On the other hand, allowing the donor network operator to charge the user for the costs of a port may suggest the necessity of regulating this charge; if the charge is not regulated, it is possible for the donor network operator to inflate it in order to discourage users from switching to a competitor's network. However, the likelihood that a charge by the donor network operator will never be waived means that the charge acts as a disincentive to frequent and unnecessary switching of networks which, it may be argued, would have a destabilising effect on the mobile market.

The fee charged to users for porting a mobile number among CEPT countries for which information is available ranges from 0 € up to 43,55 €; the average charge is 8,38 €.

| Country | Original announced costs | Costs in Euros (rates from 3 August 2005) |
|----------------|--------------------------|--|
| Austria | 19 € ¹ | 19 € |
| Belgium | No fee ² | — |
| Croatia | No fee | — |
| Cyprus | No fee | — |
| Denmark | No fee ³ | — |
| Estonia | No fee | — |
| Finland | No fee | — |
| Hungary | No fee | — |
| Ireland | No fee | — |
| Italy | 10 € ⁴ | 10 € |
| Lithuania | No fee | — |
| Netherlands | 9,08 € | 9,08 € |
| Norway | About 85 NOK | 10,82 € |
| Portugal | 40 € ⁵ | 40 € |
| Slovenia | 10 € | 10 € |
| Switzerland | No fee | — |
| United Kingdom | Up to 30 GBP | 43,55 € |

Table 10: Fee charged per port

1. At the moment not more than 19 € (including 4 € for customer information sheet)
2. In practice by law maximum of 15 €.
3. Some recipient service providers charge a small fee.
4. Typically there are offers such as there is no charge.
5. This costs is used as a credit account (spendable in calls)

Number database costs

The cost of establishing and operating a national number database to support mobile number portability is difficult to determine. This is primarily because such information is generally regarded as confidential. The cost may also be difficult to calculate if the database for mobile numbers shares some of the same management arrangements or infrastructure with databases for other types of ported numbers.

The methods used to recover the establishment and operating costs associated with a number database are either:

- The company that manages and/or operates the database meets all costs itself and, in turn, recovers these by imposing fees on users of the database for the services it provides to them;

or:

- Network operators which are subject to number portability obligations contribute to meeting the costs, generally on the basis of a formula related to market share, quantities of numbers in the database for which it is responsible, or another similar method.

Call-related costs

A call to a ported mobile number may involve costs additional to those that would be incurred if the number was not ported (or, indeed, if no mobile numbers were ported). There are two principal costs of this nature:

- Additional conveyance costs, associated with carrying a call from an intermediate network (typically the network originally associated with the called number) to the terminating mobile network; and
- Database dip costs, associated with querying a ported number database.

Neither cost may be incurred under all approaches to implementation of mobile number portability. Additional conveyance costs are associated with the onward routing and call drop back implementations of mobile number portability in which a call to a ported number is initially routed to the mobile network originally associated with the number. Database dip costs are generally associated with all call query and query on release implementations which involve triggers in the call processing to query Intelligent Network databases.

Little data is available on additional conveyance costs in CEPT countries in which mobile number portability has been implemented, but it is generally accepted that such costs are relatively low. There is considerable variation in the approaches adopted or planned for apportioning additional conveyance costs between market players, comprising the following:

- The costs are borne by the originating network, except where the network originally associated with a ported number prescribes an inefficient method of routing calls to ported numbers;

or:

- The costs are borne by the originating network, except where these costs are negligible;

or:

- The costs are split between the originating network operator and the network originally associated with a ported number;

or:

- The costs are borne by the network originally associated with a ported number;

or:

- The costs are borne by the terminating network;

or:

- The network that undertakes additional conveyance bears its own costs.

| Country | Costs borne by originating network | Costs split between originating network & network originally associated with number | Costs borne by network originally associated with number | Costs borne by terminating network | Costs borne by network undertaking additional conveyance |
|----------------|------------------------------------|---|--|------------------------------------|--|
| Belgium | X ¹ | | | | |
| Croatia | | | | | X |
| Cyprus | X | | | | |
| Estonia | | | | X | |
| Finland | | X | | | |
| Hungary | X | | | | |
| Ireland | X | | | | |
| Italy | | | | X | |
| Lithuania | X | | | | |
| Malta | X | | | | |
| Portugal | X ² | | | | |
| Slovenia | X | | | | |
| Sweden | X | | | | |
| Switzerland | | | X | | |
| United Kingdom | | | | | X |

Table 11: Approaches to apportioning additional conveyance costs

1. Except if network originally associated with number prescribes less efficient method for routing of calls, in which case it pays difference between cost of method it prescribes and cost of most efficient method.
2. Except if costs are negligible, in which case they are borne by each network that incurs costs.

No data is available on database dip costs but, again, it is generally assumed that these costs are quite low. There is also a range of approaches adopted or planned for apportioning database dip costs between market players:

- The costs are borne by the originating network, except where the network originally associated with a ported number prescribes an inefficient method of routing calls to ported numbers;
- or:
- The costs are borne by the originating network, except where these costs are negligible;
- or:
- The costs are borne by the network originally associated with a ported number;
- or:
- The network that performs a database dip bears its own costs.

| Country | Costs borne by originating network | Costs borne by network originally associated with number | Costs borne by network performing database dip |
|------------------------|------------------------------------|--|--|
| Belgium | X ¹ | | |
| Croatia | X | | |
| Germany | | | X |
| Hungary | X | | |
| Ireland | X | | |
| Lithuania ² | | | |
| Norway | X | | |
| Slovenia | | | X |
| Sweden | X | | |
| Switzerland | | X | |

Table 12: Approaches to apportioning database dip costs

1. Except if network originally associated with number prescribes less efficient method for routing of calls, in which case it pays difference between cost of method it prescribes and cost of most efficient method.
2. All operators/service providers have to pay yearly fee to CDB administrator; Fee is ~ 0,29 EUR for every number in use

9 TARIFF TRANSPARENCY

Users find it desirable to be able to predict the price of calls to mobile numbers, and porting of mobile numbers should ideally not undermine this capability. Mobile number portability may, however, potentially reduce tariff transparency for mobile users due to the price difference that commonly exists between on-net and off-net calls from mobile networks. This is because, in a mobile number portability environment, users lose the capacity to distinguish between on-net and off-net calls on the basis of the prefix of the number.

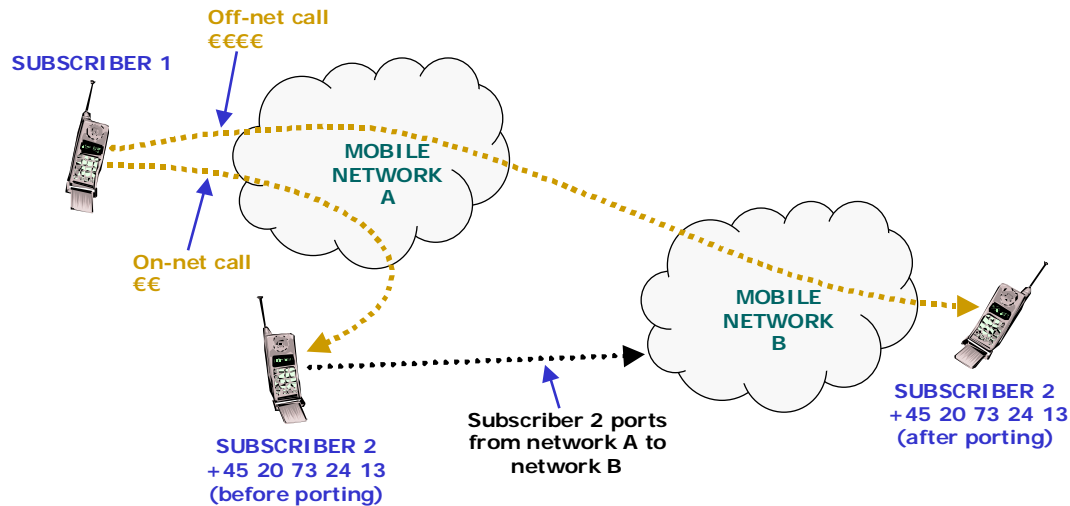


Figure 1: Principles of mobile number portability

Given the substantial difference that sometimes exists between the cost of an on-net call and the cost of an off-net call, the capability to distinguish between on-net and off-net calls may be a sensitive issue. This is because the absence of such a capability may adversely affect the usability and affordability of mobile services for users and has the potential to generate controversy.

The potential sensitivity of callers' ability to distinguish on-net from off-net calls no doubt contributed to the inclusion in the EU Universal Service Directive of a statement urging national regulatory authorities to facilitate appropriate tariff transparency as part of the implementation of number portability.

Nevertheless, it is appropriate to recognise that the ability to distinguish between on-net and off-net calls is affected by more than just porting of mobile numbers. Pricing arrangements under the control of operators may reduce the transparency of mobile call tariffs considerably more than number portability. Operator pricing arrangements that may reduce tariff transparency include pre-payment and bundled tariff packages (for example, in which a certain amount of call minutes are free).

The problem of tariff transparency is recognised in many of the countries in which mobile number portability is implemented or planned for implementation. The problem has generally been addressed by ensuring that mobile users have access to information that enables them to predict the cost of a call to another mobile number. This information may be provided via a recorded or live telephone information service or an SMS information service, which provides the correct tariff information on input by the user of the number that will be called. An alternative approach is to provide an audible warning at the beginning of a call that indicates it will be charged at an off-net rate.

| Country | Service indicating network to which specified number belongs (voice-based) | Service indicating network to which specified number belongs (SMS-based) | Tariff information service | Audible warning of off-net call at start of call |
|-----------------------|--|--|----------------------------|--|
| Austria | | | | X |
| Belgium | X | X | | X |
| Croatia | | | | X |
| Denmark | | | X | |
| Estonia | | | X ¹ | |
| Finland ² | X | | | |
| Hungary | X | X | | |
| Iceland ¹ | | | | |
| Ireland ³ | | X | | X |
| Lithuania | | | | X |
| Malta ⁴ | X | X | | |
| Norway | X | | | |
| Portugal ⁵ | X ⁶ | | X ⁷ | |
| Portugal | X | | | |
| Slovenia | | X | | X |
| Switzerland | | X | | |

Table 13: Methods of providing tariff transparency

1. Information on operators websites.
2. Also a www-based service
3. Varies depending on the network
4. Different operators use different methods
5. If mobile operators have tariff plans that might imply that a call to a ported number is more expensive than before portability.
6. The clients can inhibit or re-activate this indication without any charge to them. This indication is provided on line at start of voice calls between mobile networks and addressed to ported numbers
7. This tariff information service is provided by telephone.

10 SPECIAL MOBILE NUMBERS AND SERVICES

10.1 Voicemail numbers

In some CEPT countries, mobile network operators assign special mobile numbers to their subscribers for deposit and/or retrieval of voicemail, in addition to the standard mobile number associated with subscribers' mobile service.

Particular numbering arrangements have been adopted in some countries or networks for mobile voicemail numbers, such as creating a numeric relationship between a standard mobile number and a mobile voicemail number. For example, a user's standard mobile number may be in the form '0171 abcdefg' and the corresponding voicemail number in the form '0171 13 abcdefg'. Special handling may be required if this relationship is to be preserved when a mobile user ports both numbers (or, more problematically, when just one of the numbers is ported).

10.2 Data and fax numbers

GSM standards specify that, for calls to mobile terminals that originate on the fixed network, the terminating mobile network may seek to identify the bearer capability that is required depending on the nature of the call. Bearer services that may be supported by mobile networks include telephony, data, facsimile, etc. Identification of the required bearer capability ensures that a call is presented to a mobile terminal in a form that is appropriate to the content.

For calls that originate on the fixed network, there is no direct means of specifying the required bearer capability. However, mobile network operators have the option of adopting a multi-numbering scheme in which several E.164 numbers are associated with a single mobile subscriber, and each number is used for a different bearer capability. Thus, a mobile subscriber may be assigned not only a standard mobile voice number, but also a mobile fax number and a mobile data number. A call originating on the fixed network should, if a mobile subscriber is assigned a mobile fax number or a mobile data number, use this number in order to specify that the call is not a voice call but a fax or data call.

10.3 Pre-paid services

Users with pre-paid mobile services may have as much interest in retaining their number when switching network as do users with post-paid services. In most CEPT countries in which mobile number portability is planned or implemented, mobile numbers associated with pre-paid services can be ported.

| Country | Voicemail number | Data & fax numbers | Pre-paid services |
|----------------|------------------|--------------------|-------------------|
| Austria | X | X | X |
| Belgium | | X | X |
| Croatia | X | X | X |
| Cyprus | X | X | X |
| Denmark | X | X | X |
| Estonia | | | X |
| Finland | | X | X |
| France | X | X | X |
| Germany | | | X |
| Hungary | X | X | X |
| Iceland | | | X |
| Ireland | X | X | X |
| Italy | | X | X |
| Lithuania | X | X | X |
| Luxembourg | X | X | X |
| Malta | | | X |
| Netherlands | X | X | X |
| Norway | X | X | X |
| Portugal | X | X | X |
| Slovenia | | | X |
| Sweden | | X | X |
| Switzerland | | X | X |
| United Kingdom | | | X |

Table 14: Existence of requirements for porting in respect of special types of numbers & services

11 CONCLUSIONS

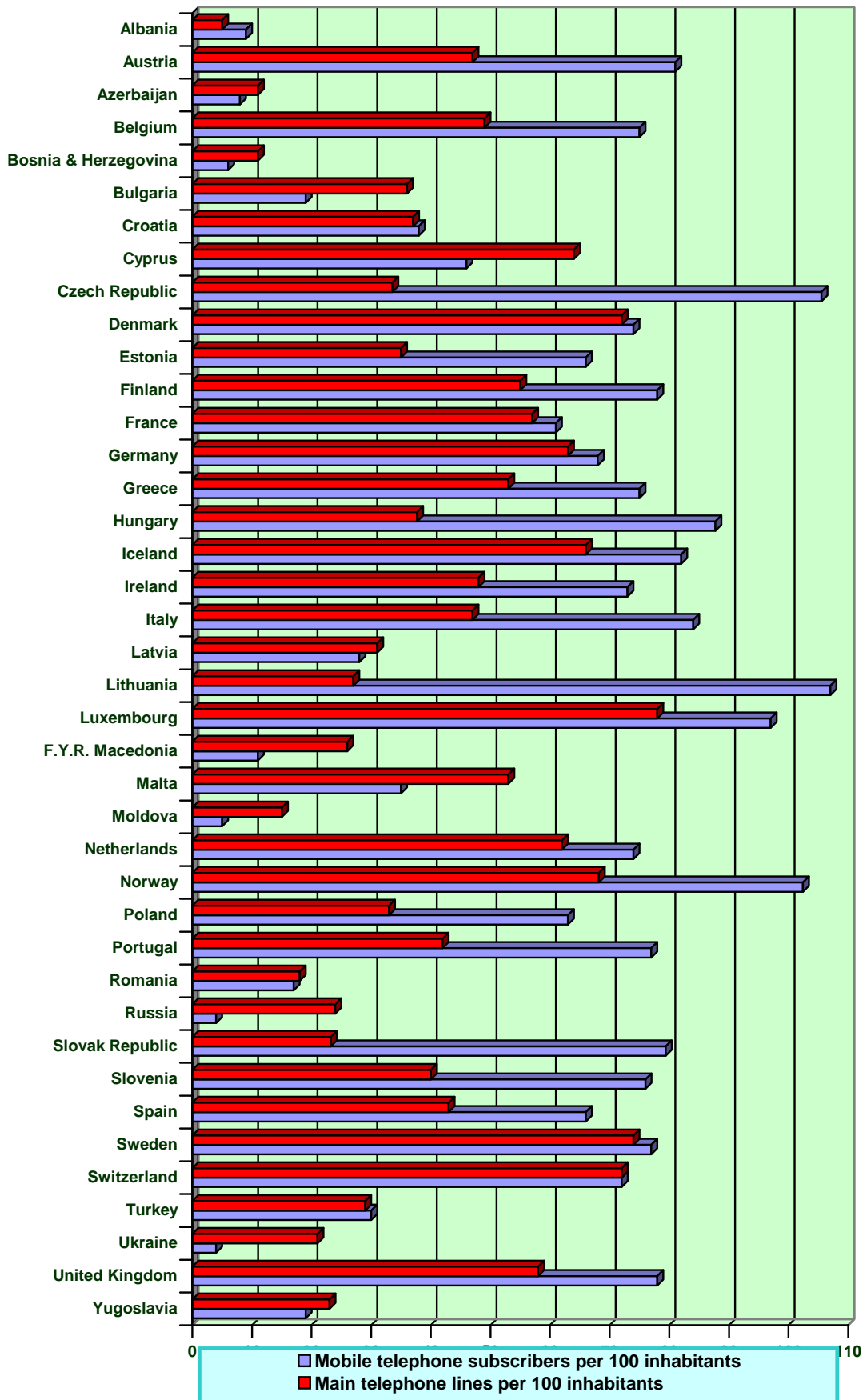
The increasing importance of mobile telephone numbers to users means that the achievement of a successful implementation of mobile number portability is critical to ensuring the benefits of a liberalised market flow through to mobile services.

Mobile number portability has now been introduced or is actively being planned in up to 29 European countries. Mobile number portability has been implemented (September 2005) in 24 countries. The approach to implementation being taken across these countries shows considerable variation. There are, however, a number of common themes:

- The *involvement of industry* in developing the detailed specifications – and in some cases the high-level specifications – for introducing mobile number portability is clearly important. The task of establishing the forums and procedures to permit this involvement in a fair, transparent and effective manner should not be under-estimated;
- Centralised *number databases* are evidently the most favoured approach to managing data associated with ported mobile numbers that must be shared among network operators. This approach may also facilitate cross-border access to this data should such access become desirable in order to optimise cross-border routing of calls to mobile numbers;
- Aspects of the implementation of mobile number portability such as selection of a method (or methods) for routing of calls, and administrative procedures for porting of numbers are clearly very important. Some lesser aspects, however, notably the handling of *mobile voicemail*, *data and fax numbers*, and *routing of SMS traffic*, are also important and, if ignored until late, may impede progress towards implementation;
- The *administration of the porting process* is a complex matter, involving the careful balancing of factors such as cost, convenience, simplicity, speed, reliability and robustness. Although each country reaches a different outcome in balancing these considerations, it is important that all of them are properly assessed to ensure that the administrative process that is implemented does not adversely affect the success of mobile number portability;

- Similarly, different approaches to determining the *apportionment of costs* associated with the implementation and operation of mobile number portability results in variation across CEPT countries regarding how the various entities involved in the operation of mobile number portability bear these costs. Nevertheless, it is clear that some considerations will almost always be paramount. These considerations include creating incentives to keep costs and charges low and promoting efficiency; and
- The reduced *tariff transparency* that would normally result from the introduction of mobile number portability is a problem that could seriously affect the usability and affordability of mobile services for users. Solutions are, however, available to ensure that tariff transparency is preserved when mobile number portability is introduced.

ANNEXES



Statistics on previous page shows fixed and mobile penetration rates in 40 of the 46 CEPT countries. Source: ITU World Telecommunication Indicators Database updated with information from individual countries. This figure has been moved to annex in comparison to the original report as the accuracy of the information has not been able to be checked for all countries.

COUNTRY SPECIFIC ADDITIONAL INFORMATION

General information

Cyprus

Currently an Interim Number Portability solution is implemented in Cyprus, which is not incorporating a centralised database. This interim solution was implemented due to the specific characteristics of the Cyprus market (small market and 2 mobile network providers and 1 fixed network provider, at the time of introduction) and due to time constraints. The method of Direct Routing has been agreed and is used by obligated providers. An automated solution is planned to be implemented should this be considered necessary in the future.

France

There are 388400 mobile numbers ported in France (per 1st October 2005)

Lithuania

Mobile telephone subscribers in Lithuanian are 4 073 902 subscribers.
Pre-paid are 2704810 subscribers.
Post-paid are 1369092 subscribers.

Russia

At present Russia is just at the initial stage of implementation of Mobile Number Portability. Specialists discuss organizational and technological issues, such as the methods of building up a database, sending requests and transfer of a routing number. It would be nice if a new report could contain information on these issues collected from various countries.

Chapter 5: Call Routing

Italy

Also for SMS routing, different technique can be used, for example in Italy, for SMS originated in international PLMN's a indirect routing technique has been defined, while for the SMS originated in the national PLMN's a direct routing technique is foreseen.

Switzerland

Mobile operators were implementing Mobile Number Portability Signaling Relay Function (MNP-SRF) according to the ETSI-GSM Standard GSM 03.66 Version 2.0.0 Release 1999-01: Digital cellular telecommunications system (Phase 2+); Support of Mobile Number Portability (MNP):

- Technical Realisation; Stage 2; Part 1
- IN Call-Related; Technical Realisation; Stage 2; Part 2
- Handling of Non-Call Related Signalling; Technical Realisation; Stage 2; Part 3
- MNP Signalling Relay Function – Call Related; Technical Realisation; Stage 2; Part 4

Chapter 6: Number Databases

Italy

Another possibility it's that each operator handles a database with the data of all the ported numbers. These databases are updated for each ported number by means of information exchanged among the mobile operators, for example the Recipient could inform all the other operators. These information has to be sent before the cut-over in order to synchronize the updates.

Chapter 7: Administration of Porting

7.2 Porting procedures

Authentication

Italy

The recipient asks the user a set of data, like SIM or phone serial number and in case of post-paid fiscal code that are electronically verified with respect to those known from the donating.

Refusal of port

Italy

- mismatch of the data in the validation process
- service deactivated
- arrival of a successive request (before the validation is given)

Chapter 8: Economic Arrangements

Porting costs

Italy

The donor network operator is not permitted to charge the user for porting a number, while the recipient network operator is permitted to charge the user for porting a number.

Number database costs

Italy

- A distributed solution has been adopted and, consequently, each operator sustains its own cost.

Chapter 9: Tariff Transparency

Italy

All the mobile operators have implemented a common transparency service. A NRA monitoring unit has promoted the introduction of a common transparency service, based on a code: "456". If a mobile user dial 456 before a mobile number, he will receive information regarding portability: typically if the mobile number belong to the same mobile operator of the caller (on-net tariff) or not (off-net). Same operators, as requested by the NRA monitoring unit, after this information complete the call. The service is free of charge. At least one operator, instead of the previous information, explicitly provides the name of the mobile operator of the number following the code "456".

Moreover, in addition at this common procedure, an operator has implemented a second service that can be deactivated, which provides the previous information every time the call is directed to a number that has been ported-in or ported-out from this operator.

In addition, some operators have implemented other transparency services, via SMS and WEB. All the services are provided free of charge.

Chapter 10: Special Mobile Numbers and Services

Austria

Voicemail, fax and data numbers are included, by the portability obligation.

10.1 Voicemail numbers

Italy

In order to access to the voicemail also calling from the fixed network without involving the mobile donor network specific routing numbers have been introduced. In this way, a common procedure to access to voice mail of the mobile operator have been introduced. In order to access to the voicemail of a mobile operator, the following codes have to be dialed before its own number in the national format (ported or not ported): 32 for Wind users, 36 for TIM users, 34 for Vodafone users, 390 for H3G users. This number is usable also in International format (that is +39 <voicemail code> <phone number>). In this way there is a direct access to the voicemail, without the involvement of the donor network.

Time scale for mobile number portability implementation in CEPT
Countries – for updating the ECC Report 31

