

MOBILE NUMBER PORTABILITY: CASE FINLAND

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Abstract

Mobile number portability (MNP) means the ability of mobile subscribers to switch between service providers while retaining their original mobile phone numbers. MNP removes barriers to competition by lowering the switching costs of the end-users. MNP has been implemented in most of the advanced markets throughout the world.

In the European Union, the MNP regulation is based on the Universal Service Directive (Directive 2002/EC/22). The directive requires operators to implement fixed-to-fixed and mobile-to-mobile number portability. In some markets, for example in the US, also fixed-to-mobile number portability is required. In Japan, MNP is not yet required by the regulator.

In Finland, MNP was implemented in July 2003, having a strong effect on the competition on the market. Numbers of portings have far exceeded those in experienced in other countries. Reasons for this include e.g. the banning of handset subsidies and long subscription contracts, user-friendly and free-of-charge porting process, and heavy marketing campaigns of mobile operators.

Key Words: MNP, regulation, churn

1. Introduction

1.1 Terminology

Mobile number portability (MNP) can be defined as the ability of mobile subscribers to switch between service providers while retaining their original mobile phone numbers. MNP can be seen as an example of service provider portability, one of three basic types of number portability (Table 1).

Table 1: Number portability types

Portability type	Service portability	Service provider portability	Location portability
Aka		Operator portability	Geographic portability
Examples	Fixed-to-mobile PSTN-to-ISDN	Mobile-to-mobile, fixed-to-fixed	Fixed number portability inside a local exchange area

In most countries, mobile phone numbers are non-geographic in nature. They have distinct area codes making them recognizable and allowing operators to charge the mobile terminated calls differently. In these countries, location portability is non-relevant from the point of view of MNP. Some countries, such as the United States and Hong Kong are, however, using the area codes of fixed line telephone numbers also for mobile phones. In these countries, one operator may have different pricing schemes for local and long-distance mobile calls within its network. Thus, one has to separate between MNP with and without location portability.

Service portability is also relevant when comparing the MNP solutions in different countries. In some countries, the requirement for MNP also includes fixed-to-mobile portability.

1.2 MNP and stakeholders

MNP reduces the switching costs of customers desiring to switch their subscriptions from one operator to another. These switching costs include e.g. informing friends and business partners about the new number, missing calls from uninformed people, and updating company web pages, brochures, and business cards. On the other hand, MNP makes it more difficult for the customers to know which network they are calling to. Operators are no longer identified by the prefixes of the phone numbers, making it more difficult to find out the actual prices of the calls. This problem can be alleviated by subscribing to a single-rate call plan, if possible.

From the network operator point of view, MNP gives rise to additional costs, related to investments to number portability databases and upgrading and configuring the switching equipment.

From the service operator point of view, MNP makes it easier to attract new customers - and harder to keep the existing ones. In other words, MNP increases the churn rates of service operators.

The rest of the paper is organized as follows. Section 2 gives an overview on the status of regulation in different markets, and Section 3 introduces alternative technical solutions for the implementation of MNP. In Section 4, the impact of MNP in the Finnish market is analyzed, and reasons for the exceptionally high number porting rates are discussed. Finally, Section 5 concludes the paper.

2. Regulatory status

MNP has been recognized as an important driver of competition by regulators around the world. During the late 1990's and early 2000's, MNP has been implemented in most of the advanced markets. Figure 1 shows the MNP implementation status in Europe and in selected other countries.

1997	1998	1999	2000	2001	2002	2003	2004
Singapore		Hong Kong U.K. Netherlands	Switzerland Spain	Denmark Sweden Norway Portugal Australia	Italy Belgium Germany	Finland France Austria Greece Ireland Iceland Luxembourg	Lithuania Slovakia South Korea USA (as whole)

Figure 1: MNP implementation in some countries
(Source: ECC 2003)

2.1 Regulation in the European Union

The European Parliament and Council of Ministers adopted on 7th March 2002 four new directives dealing with telecommunications regulation. Directive 2002/EC/22 (Universal Service Directive) states, among other things, 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.

National regulatory authorities shall ensure that pricing for interconnection related to the provision of number portability is cost oriented and that direct charges to subscribers, if any, do not act as a disincentive for the use of these facilities.

The requirement for number portability does not apply to the porting of numbers between fixed and mobile networks. (EU 2004)

Based on the directive, all the member countries of the European Union were required to implement mobile number portability by July 25, 2003.

2.2 Regulation in the United States

In the United States, the basis for current telecommunications regulation was laid in the Telecommunications Act of 1996. According to the Act,

each local exchange carrier (LEC) has the duty to provide number portability, defined as “*the ability of users of telecommunications services to retain, at the same location, existing telecommunications numbers without impairment of quality, reliability, or convenience when switching from one telecommunications carrier to another*” (FCC 1996).

Interestingly, in the US, the mobile phone subscriptions are not assigned any mobile specific area codes, which is the case in most countries. The mobile phone numbers are taken from the same number space than fixed line numbers, and it is impossible to know if a phone number is associated with a mobile phone just by looking at the number. Accordingly, it is only possible to port a mobile phone number to an operator that is serving the same geographical area as the donor operator. Accordingly, the process is called Wireless Local Number Portability (WLNP).

WLNP became available in the 100 largest markets in November 2003 and in the whole country in May 2004. Fixed-to-mobile portability is also required in most areas, as long as the wireless operator is serving the same geographical area as the fixed line operator.

2.3 Other markets

In Japan, MNP is not currently available. The Japanese authorities have, however, stated that MNP should be implemented as soon as possible, and scheduled it to happen in 2006. (MPHPT 2004)

In South Korea, MNP has been available since January 2004 and in Hong Kong since March 1999.

3. Technical solutions

From technical point of view, the implementation of number portability requires a substantial amount of work and changes in the telecommunications infrastructure. Typically, the implementation includes a number portability database and a selection of suitable routing methods for different types of calls and messaging services.

3.1 Number portability database

The number portability database (NPDB) keeps track of the ported numbers and their respective service providers. The NPDB information is used to determine the correct terminating network for the calls and messages.

The NPDB can be either centralized or distributed. In the centralized model, there exists a single reference database containing data for the numbers of all service providers. The reference database is frequently copied to service providers' operational databases. In the distributed model there exist multiple databases, each containing subsets of the total data, e.g. only the numbers assigned to particular service provider.

In most of the countries a centralized database is used, and typically managed by a consortium of mobile network operators. (ECC 2003)

3.2 Call routing

The routing of calls to a mobile network associated with a ported mobile number can be handled in multiple ways. The different methods can be divided into two broad classes: direct routing and indirect routing. A report from the Electronic Communications Committee (ECC 2003) lists four possible alternatives for call routing, one resembling direct routing and the others belonging to the indirect routing class (Figure 2).

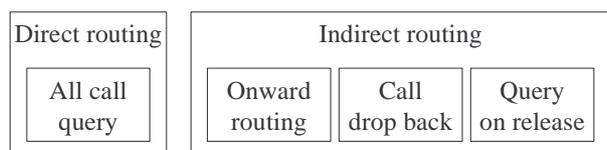


Figure 2: Call routing methods

In *all call query*, the calls are routed directly from the originating network to the correct terminating mobile network, requiring the former to determine the appropriate network for a given number.

In *onward routing*, the mobile network originally associated with the called number identifies the correct terminating mobile network and routes the call onward.

In *call drop back*, the mobile network originally associated with the called number identifies that the number is ported and releases the call back to the originating network together with information identifying the correct terminating network.

In the fourth alternative, *query on release*, 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 is moved. The originating network then queries a database to obtain information identifying the correct terminating network.

The routing method often depends on the type of the network the call originates on. Distinction can be made between calls originating on

- a mobile network within the same country,
- a fixed network within the same country, and
- a network in another country.

Furthermore, it may not be necessary for all networks in a particular country to use the same routing method. (ECC 2003)

3.3 SMS and MMS routing

In order to give full benefit to end-users, the MNP solution should include also porting of SMS and MMS

services along with the mobile phone number, although this has not been the case in all countries. From a technical point of view, SMS and MMS messages require routing mechanisms different from voice calls. SMS messages are delivered using the signaling network (SS7), while MMS is based on the wireless application protocol (WAP) running over packet or circuit switched data.

Alternative routing methods for SMS and MMS are specified in 3GPP technical specifications (TS 23.066 and TS 23.140). The routing can happen either directly or indirectly.

4. Case Finland

In Finland, MNP was implemented in July 2003. Since then, the amount of ported numbers has been exceptionally high when compared to any other country in the world. As an example, Figure 3 illustrates the evolution of ported mobile numbers in Nordic countries. To be comparable, the amount of ported numbers has been divided by the total number of mobile subscriptions in each country.

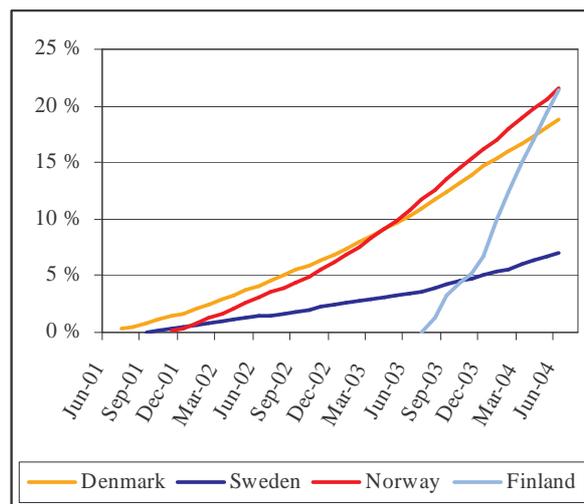


Figure 3: Cumulative number of ported mobile numbers as a percentage of total number of subscriptions, July 2001 – August 2004. (Source: Numpac 2004, SNPAC 2004, NPT 2004, ITST 2004)

As the figure shows, the rate of number portings differs significantly between the countries. In Finland, the porting rate has been the highest, whereas Sweden has had clearly less portings than the other countries. Norway and Denmark have quite similar porting rates.

In the following subsections, a closer look is taken on the case of MNP in Finland.

4.1 Regulation and technical solution

In Finland, the MNP requirements set by the Universal Service Directive are included in the Communications Market Act (MINTC 2003). Based on the Act, the

Finnish Communications Regulatory Authority (FICORA) has given more detailed orders for the MNP implementation.

FICORA has chosen to require a direct routing method to be used for number portability. According to the regulation, mobile-to-mobile voice calls, short messages and multimedia messages must already be routed directly. Fixed-to-mobile calls must use direct routing by 30 September 2005, and fixed-to-fixed calls by 31 March 2006. Before these dates, indirect routing can be used. (FICORA 46 B/2004 M)

All the Finnish mobile operators have been required to implement a so-called “Master system” (i.e. a NPDB) to manage number portability. To fulfill the requirements, the mobile operators decided together to found a specialized management company to manage and control the MNP. The company, Suomen Numerot Numpac Oy, began its operations in June 2003. (Numpac 2004)

According to the Communications Market Act, “a telecommunications operator shall not charge a user for the transfer of a telephone number to another telecommunications operator.” The donor operator may, however, receive a one-off payment equivalent to the one-off costs of transferring the telephone number (MINTC 2003). Figure 3 shows all the fees related to mobile number portability in Finland.

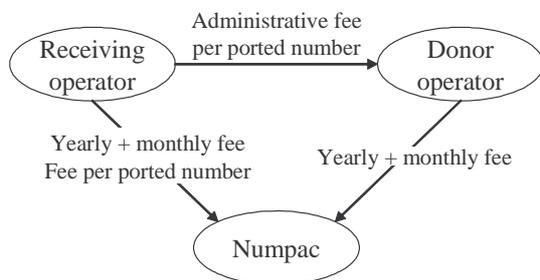


Figure 4: MNP-related fees in Finland
(Source: Numpac 2004)

The fact that MNP has been free for the end-users from the very beginning, has undoubtedly driven the competition and churn among Finnish operators.

4.2 Competitive impact in the market

The market impacts of MNP in Finland seem to have far exceeded those witnessed in most other countries. Figures 5 and 6 illustrate the evolution of Finnish operators’ subscriber base and churn one year before and one year after MNP was introduced.

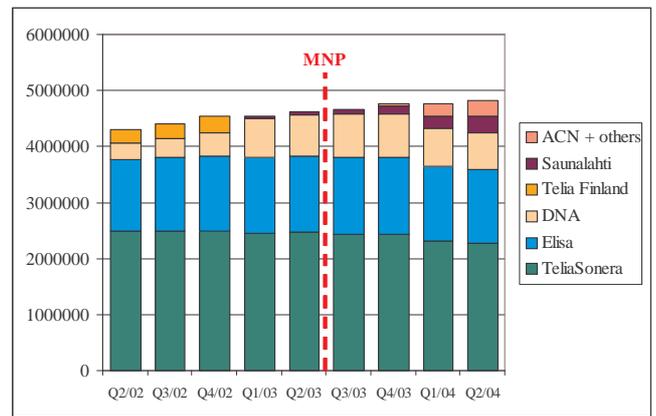


Figure 5: Subscriber base evolution among Finnish mobile operators

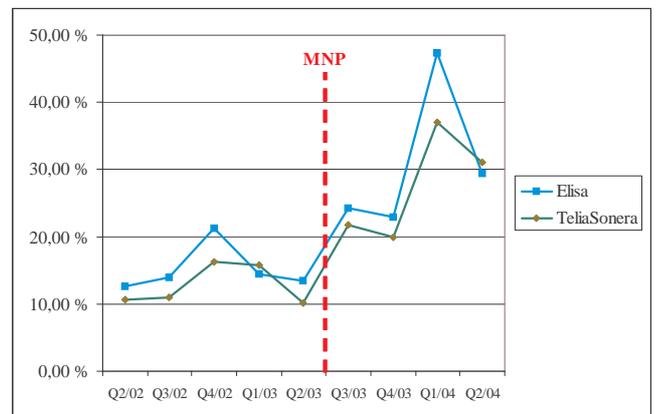


Figure 6: Churn evolution among the largest Finnish mobile operators

As illustrated in Figure 5, the market share of Saunalahti and other MSOs has increased significantly after the introduction of MNP in July 2003. In just one year (June 2003 – June 2004) the combined market share of TeliaSonera, Elisa, and DNA has fallen from 98.7% to 87.9%.

The change in the marketplace is also very visible in the churn evolution. Before MNP was implemented, the churn of TeliaSonera and Elisa had been floating around 15%. After the MNP implementation, the churn jumped significantly, and is currently about 30% with both operators.

It seems that the implementation of MNP was the final trigger to boost the competition in the Finnish mobile market to a new level. There are, however, also other reasons behind the exceptionally high churn rates in Finland.

4.3 Reasons behind the MNP effect

According to Porter (1980), there exist four fundamentally different strategies any company in any industry can drive. Companies must choose between service differentiation and cost leadership, i.e. providing better service than competition with a price premium or providing basic service with a lower price. Regardless

of this first decision, companies can have either a broad or focused target market.

The current situation in the Finnish mobile market can be best described as a price war. This has happened because differentiation between operators' offerings is minimal. All the network operators have a good coverage in the whole country and mobile data services have not been used as differentiation means.

In the current situation, the operators have been trying to win customers from each other mainly by organizing heavy marketing campaigns and offering non-mobile-related giveaways and free airtime. The popularity of single-rate call plans has made the price comparisons very easy for the customers, and the operators are constantly lowering their prices to match or beat the competition, even by steps of 0.001 euros/minute.

MNP removed the last barrier of free competition from this price-centric market. Finland is one of the only countries, where bundling of mobile subscriptions is banned, together with SIM-locked phones and long service contracts. Furthermore, as the MNP process as itself is costless and very easy for the end-users, there are very few things locking customers to their existing operator.

As said, in this (and every other) kind of a market, one can succeed in two ways: by differentiating or by being the cost leader. The former strategy carries benefits such as increased ARPUs and lower churns, while the latter leads to the opposite. Differentiation by unique, unmatched services requires investments on innovative ideas, but currently the money seems to be flowing to advertising agencies and TV stations. The current state in the market is unhealthy for the Finnish mobile industry as a whole.

6. Conclusion

The paper introduced the concept of mobile number portability, related regulation, and alternative technical solutions. Furthermore, the market impact of MNP was discussed using the situation in the Finnish marketplace as an example.

The reasons behind the high churn rates in Finland include the banning of handset subsidies and long service contracts, availability and popularity of single-rate call plans, and most importantly the unhealthy price war with one-to-one service offerings centered on phone calls and SMS messages.

MNP does not generate churn, it only removes one barrier from the way of free competition. In order to keep the churn rates low, operators should rather be offering unique and valuable mobile data services than carry on the endless price war with diminishing margins.

References

- 3GPP TS 23.066 V5.3.0 (2003-12). Technical Specification. 3rd Generation Partnership Project; Technical Specification Group Core Network; Support of Mobile Number Portability (MNP); Technical realization; Stage 2 (Release 5)
- 3GPP TS 23.140 V6.7.0 (2004-09). Technical Specification. 3rd Generation Partnership Project; Technical Specification Group Terminals; Multimedia Messaging Service (MMS); Functional description; Stage 2 (Release 6)
- ECC, 2003. ECC Report 31, Implementation of Mobile Number Portability in CEPT Countries, March 2003.
- EU, 2004. Regulatory framework for electronic communications in the European Union, Situation in September 2003.
http://europa.eu.int/comm/competition/liberalization/legalisation/regulatory_framework.pdf
- FCC, 1996. Telecommunications Act of 1996, Pub. LA. No. 104-104, 110 Stat. 56 (1996). Available at: <http://www.fcc.gov/telecom.html>
- FICORA 46 B/2004 M. Regulation on telephone number portability. 10 March 2004. Available at: <http://www.ficora.fi/englanti/document/FICORA46B2004M.pdf>
- IT- og Telestyrelsen (ITST) Denmark, 2004. Web-site. Available at: <http://www.itst.dk>
- Ministry of Transport and Communications (MINTC), 2003. Communications Market Act. Unofficial translation. Available at: <http://www.mintc.fi/www/sivut/english/tele/communicationspolicy/index.html>
- Ministry of Public Management, Home Affairs, Posts and Telecommunications, Japan (MPHPT), 2004. *Report of "Study Group on Mobile Number Portability" Released*. MPHPT Communications News, May 28, 2004, Vol. 15, No. 3. Available at: http://www.soumu.go.jp/joho_tsusin/eng/Releases/NewLetter/Vol15/Vol15_03/Vol15_03.html
- Norwegian Post and Telecommunication Authority (NPT), 2004. Web-site. Available at: <http://www.npt.no>
- Numpac Oy, 2004. Company web-site. Available at: <http://www.numpac.fi>
- Porter, M., 1980. *Competitive strategy*. New York: Free Press.
- Swedish Number Portability Administrative Center (SNPAC), 2004. Company web-site. Available at: <http://www.snpac.se>