Telecommunications Authority of Trinidad and Tobago

A Consultative Document

Draft Implementation Plan on

Number Portability

For

The Republic of Trinidad & Tobago

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Maintenance History		
Date	**Change Details**	**Version**
April 1st, 2010	First draft for public consultation	0.1

1 Introduction

1.1 Rationale

The liberalization of the telecommunications sector in Trinidad and Tobago has resulted in increased competition in both the fixed line and mobile markets over the past three years. However, users who wish to change concessionaire[1], location (outside the rate area) or service type are currently required to change telephone numbers. This is likely to cause substantial inconvenience. For example, corporate users may well incur costs associated with the production of new branding and information material so as to reflect the change in telephone contact information. This may act as a deterrent to competition.

Competition can be further promoted by mandating number portability which enables consumers to switch provider or service and change location without changing their telephone numbers. Consequently, there are three types of number portability namely: location number portability, service number portability and service provider number portability. Number portability brings benefits to both the users who do not wish to port as well as to those who wish to do so by encouraging concessionaires to offer improved packages to their subscribers in order to retain them. More attractive packages and, improved quality of service are benefits which the users in Trinidad and Tobago will enjoy. Concessionaires in Trinidad and Tobago are required by the Telecommunications Act No 4 of 2001 and the Telecommunications (Interconnection) Regulations 2006 to provide number portability as and when directed by the Authority. The Authority is now proposing to introduce the requirement.

1.2 Objectives

The objectives of this Plan are as follows:

1. To determine and propose the most efficient approach for the implementation of Number Portability in Trinidad and Tobago
2. To propose a schedule for the implementation of Number Portability

[1] Concessionaire is used interchangeably with telephone service provider which is standard industry terminology.

1.3 Regulatory Framework

The following clauses provide regulatory direction for number portability to be implemented:

Section 25 (2) (j) of the Act provides that in respect of a concessionaire's obligations, the Authority shall require a concessionaire to "*…provide, to the extent technically feasible, number portability when required to do so and in accordance with the requirements prescribed, by the Authority.*"

Condition A42 of each concession for the provision of public telecommunications services provides that the concessionaire shall, in accordance with any regulations relating to number portability, facilitate the portability of numbers assigned to any customer of any operator of public telecommunications networks or provider of public telecommunications services.

Regulation 9 of the Telecommunications (Interconnection) Regulations 2006 ("the Interconnection Regulations") mandates a concessionaire "*…to configure its network to facilitate number portability between similar networks as and when directed by the Authority*".

Regulation 2 of the Interconnection Regulations states *"…number portability means the ability of a customer to retain the same telephone number on changing telephone service providers"*.

1.4 Scope of document

This document will serve as the basis for consultation with all stakeholders and interested parties as to the objectives outlined above.

1.5 Review Cycle

As the country's telecommunications industry matures, the need will arise to revise and update this Plan. As such, the Authority shall review and revise the Plan as it deems appropriate with stakeholders and with the public.

1.6 Consultation Process

The Authority is seeking the opinion of stakeholders regarding the proposals for the introduction of Number Portability made in this document, in accordance with the Authority's Procedures for Consultations in the Telecommunications Sector of Trinidad and Tobago (http://www.tatt.org.tt). This draft plan shall be made available for two rounds of consultation.

Comments should be submitted on or before **7th May, 2010** to policy@tatt.org.tt or mailed to:

Telecommunications Authority of Trinidad and Tobago,
#5, Eighth Avenue Extension, off Twelfth Street,
Barataria,
Trinidad and Tobago.

2 Definitions

The following are definitions for terms used in this document:

Concessionaire	As defined in the Telecommunications (Interconnection) Regulations 2006
Donor network	The network of the concessionaire which is releasing the user's telephone number to the concessionaire requested by the user.
NPDB	Number Portability Database
Number Portability	As defined in the Telecommunications (Interconnection) Regulations 2006
Originating network	The network on which a call has been originated
OSS[2]	Operational Support Systems enable telecommunications companies to manage, monitor and control the telecommunications networks. Operational Support Systems include billing, customer care systems, directory services, network element and network management.
Recipient network	The network of the concessionaire to which the number is being transferred.
User	As defined in the Telecommunications Act, 2001

[2] http://www.yourdictionary.com/telecom/oss

3 Types of Number Portability

There are three basic types of Number Portability:

- Service Provider Portability
- Location or Geographic Portability
- Service Portability

3.1 Service Provider Portability

This facility generally permits users of telecommunications services to change their service provider and still retain their telephone number. This can apply to users changing between fixed providers, between mobile providers, or between a fixed and mobile provider where this is required by the regulator.

3.2 Location or Geographic Portability

This facility generally permits a user to change location and still use their original telephone number. Historically, the incumbent's network allowed users to retain their fixed telephone number only when they moved within the same rate centre. It was also permitted if the same telephone exchange served both their old location and the new location.

3.3 Service Portability

This facility generally allows a subscriber to retain his telephone number when switching from one service to another service provided by the same public telecommunications concessionaire without impairment of quality, reliability or convenience. Examples of this are

i. A user of fixed service changing to mobile service offered by the same domestic provider and retaining the same fixed line telephone number or

ii. Migration from a TDMA based mobile network to a GSM based mobile network on the same domestic provider whilst retaining the same telephone number.

iii. A user of fixed service migrating from a traditional circuit switched fixed line network to a VOIP fixed line network offered by the same domestic service provider whilst retaining the same telephone number.

3.4 Choice of Number Portability for Trinidad and Tobago

3.4.1 Location Portability

Location Portability is applicable to fixed line networks. Historically, fixed line networks typically were divided into rate centres that were not easily amenable to Location Number Portability. The tariff structure for the incumbent's fixed line network is based on an antiquated rate centre concept and distance. Hence, in the incumbent's fixed line network, location number portability has been limited to users who move from one location to another location in the same rate centre or served by the same exchange.

Should location portability be introduced with this rate structure concept, users will not be able or will find it extremely difficult to predict what their new telephone bill will be, given that it would depend on the customers' calling patterns. Hence the Authority considers that a simplification of the rate structure i.e. making it a flat rate structure, is necessary before requiring the introduction of location portability. In the absence of a 'unified' rate structure unpredictable billing patterns may act as a disincentive to users to port their telephone number. Until a single national rate for fixed line service is introduced, the Authority expects that there will be suppressed demand for location portability outside of the rate area at this time.

However, the Authority recognizes that the newer domestic fixed voice service providers utilize a flat rate billing structure and as such, can offer location portability to its users, given the newer technology deployed to offer services. The implementation of location number portability will realize more benefits to users and the Authority shall amend the Telecommunications (Interconnection) Regulations 2006 to require domestic concessionaires to provide this feature. The Authority shall work with the concessionaire who is unable to offer location number portability to enable it to do so.

Statement of Purpose on location number portability:

1. The Authority requires that location number portability be implemented by domestic fixed line concessionaires

2. The Authority will seek to amend the definition of number portability in Regulation 2 of the Telecommunications (Interconnection) Regulation, 2006 when this implementation plan is finalized

3.4.2 Service Number Portability

Service Portability enables a user to change his service without having to change his telephone number. Historically, the incumbent has transferred mobile users from older TDMA technology to the current GSM technology without the user having to change their mobile numbers. This fact suggests that the incumbent deployed some sort of number portability platform to enable the users' original number on the TDMA network to be migrated to the newer GSM technology with the users enjoying the same services or even new services.

Currently, the incumbent has started to migrate existing circuit switched land line users to its Next Generation Network (NGN). The user retains the existing suite of services (and telephone number) that he enjoyed whilst on the older circuit switched network. The above again suggests that the incumbent has deployed some sort of number portability platform to enable the user's original number to be migrated from the older circuit switched network to the NGN[3]. To some extent, this issue can be seen as a competitive decision on the part of the concessionaire concerned.

The Authority does not wish to deter the technological development of a concessionaire's network and as such makes no policy decision on this issue. The Authority will revisit this issue at a later date as the market matures.

[3] This is to be verified with TSTT

3.4.3 Service Provider Number Portability

Service provider number portability enables the user to change their service provider without the inconvenience of changing telephone number. This is the form of portability that is specifically referred to in the *Telecommunications (Interconnection) Regulations, 2006.* This facility applies to mobile to mobile service provider number portability, fixed line to fixed line service provider number portability as well as fixed line to mobile portability.

The Annual Market Report 2008 produced by the Authority stated that the penetration rates for fixed and mobile services in Trinidad and Tobago and their associated growth rates were 24.1 % and 138.2 % and 2.4 % and 19.6 % respectively[4]. This disparity between fixed and mobile penetration is due to the fact that while fixed lines are generally house-hold based and mobile is individual based, penetration is nonetheless computed on a per subscriber basis.

The high mobile penetration rates reflects the proliferation of mobile telephones arising from the availability of mobile network and services in areas where the fixed line network is unavailable and from the personal and /or individual nature of mobile devices. This may therefore account for the high growth in mobile service.

Mobile networks typically have more modern and flexible Operational Support Systems (OSSs), when compared to traditional fixed line networks, that can be easily modified to support service provider number portability. Additionally, mobile billing systems are more flexible than fixed line legacy billing systems and can more easily facilitate service provider number portability. The Authority is of the view that the introduction of this form of number portability in the mobile market will bring about more choice to users in Trinidad and Tobago.

The Authority considers therefore that service provider number portability should be applied on a phased basis in Trinidad and Tobago, where mobile service provider number portability would be implemented in the first phase, and fixed line service provider number portability in the second phase. As an initial step in this implementation, the Authority shall seek to determine the

[4] TATT Annual Market Report 2008- Page 87

readiness of the domestic concessionaires' networks so that these concessionaires can make the necessary modifications to have the feature available.

Statement of Purpose on Service Provider Number Portability:

The Authority requires that

1. Service provider number portability be implemented by the domestic mobile telecommunications concessionaires in Trinidad and Tobago within six (6) months of the final publication of this document.

2. All concessionaires of fixed line networks upgrade or change-out their OSSs to have activated the capability of service provider number portability according to the Telecommunications (Interconnection) Regulations, 2006 Clause 9 within one (1) year after the final publication of this document. Hence fixed line to fixed line service provider number portability is to be made available one (1) year after final publication of this document.

The Authority shall monitor fixed to fixed service provider number portability for a period of one (1) year after implementation. If the market demands fixed line to mobile service provider number portability and it is technically and operationally feasible, the Authority shall review and/or amend Regulation 9 of the Telecommunications (Interconnection) Regulations 2006 so as to facilitate this market requirement.

4 The Implementation of Service Provider Number Portability

4.1 Methods of Implementation

There are basically two methods of implementing Service provider number portability, either of which can be used for the porting of both mobile and fixed line numbers:

a) bilateral

b) centralized /clearing house

4.1.1 Bilateral

In this method, the administration of ported numbers is the responsibility of the service providers who maintain their own databases with ported numbers and routing information. The information is shared among the databases. However due to the redundancy in data sharing using this approach, it is considered to be an inefficient system.

4.1.2 Centralized

In this approach, the administration of ported numbers is done by a neutral party, with service providers responsible only for the routing of the calls. This is considered to be a very efficient method and is the most popular approach adopted in Europe.

4.2 Implementation Schemes

These two methods mentioned above give rise to a number of implementation schemes for the querying and routing of calls made to ported numbers as follows:

a) Onward Routing - OR

b) Query on Release- QoR

c) Call drop back

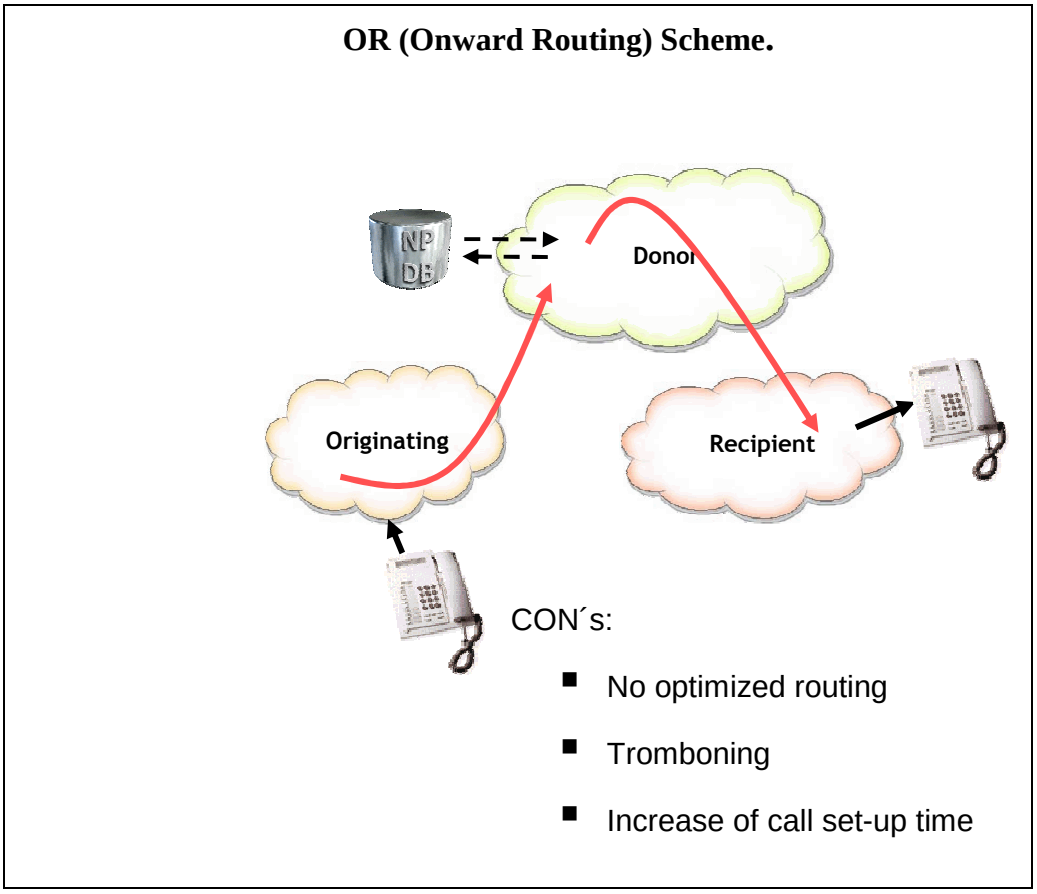
d) All Call Query- ACQ

The choice implemented by various countries was determined by the technology available and in use at the time and the cost of implementation.

Descriptions of the methods used to query and route calls made to ported numbers follow.

4.2.1 Onward Routing (OR) (Fixed line application)

Figure 1



Source: Inter Connect Communications Numbering Master Class, Bath, England. 11-15 July 2005 Number Portability Basic Principles- Part 1 by Gary Richenaker

The Onward Routing method is a bi-lateral database approach and the call progression is as follows[5] (Figure 1 refers):

1) The dialed number is routed to the donor network as this is where the Originating Network

[5] www.ietf.org/rfc/rfc3482.txt

knows that it has been assigned

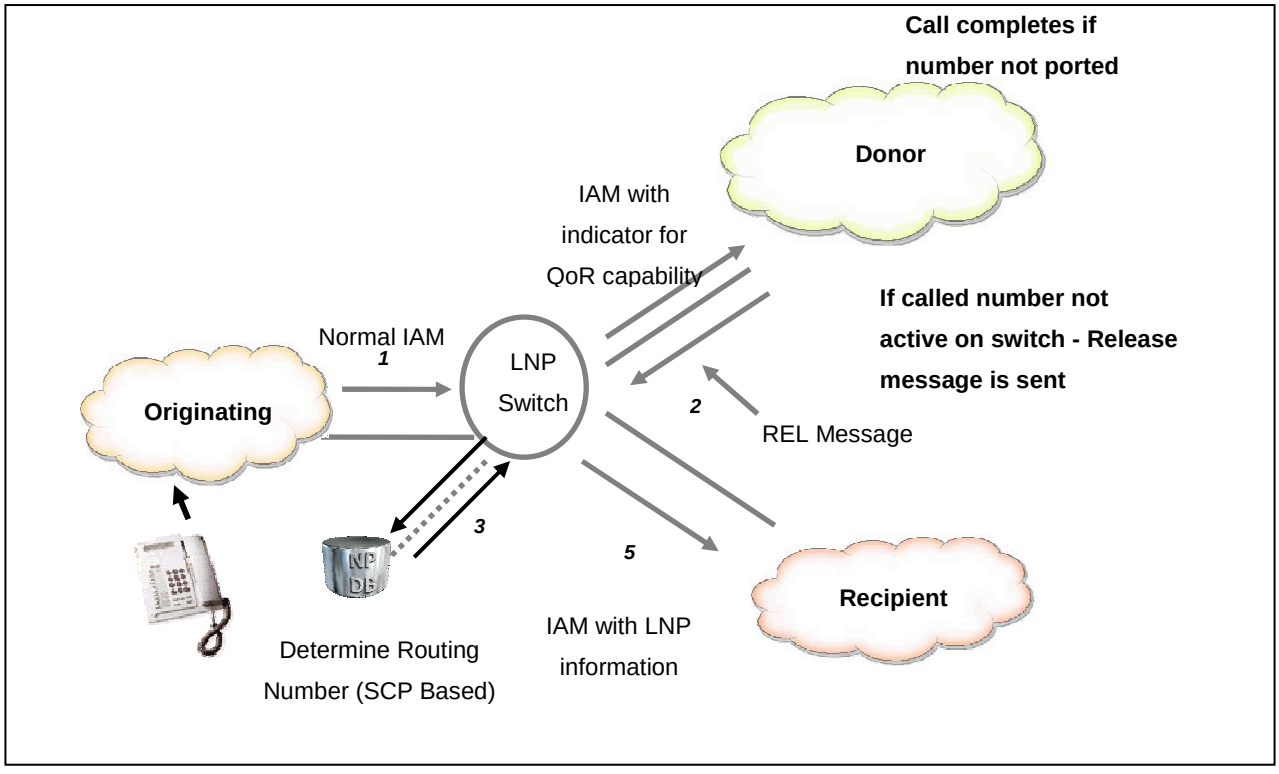
2) The donor network identifies the dialled directory number as no longer being in its inventory because it has been ported to another network and checks with an internal network-specific Number Portability Database (NPDB)

3) The internal NPDB provides the routing number associated with the dialled number to the donor network.

4) The donor network uses the routing number to route the call to the recipient network where the user has ported his number.

4.2.2 Query on Release (Fixed line application)

Figure 2



Source: Inter Connect Communications Numbering Master Class , Bath, England. 11-15 July 2005 Number Portability Basic Principles- Part 1 by Gary Richenaker

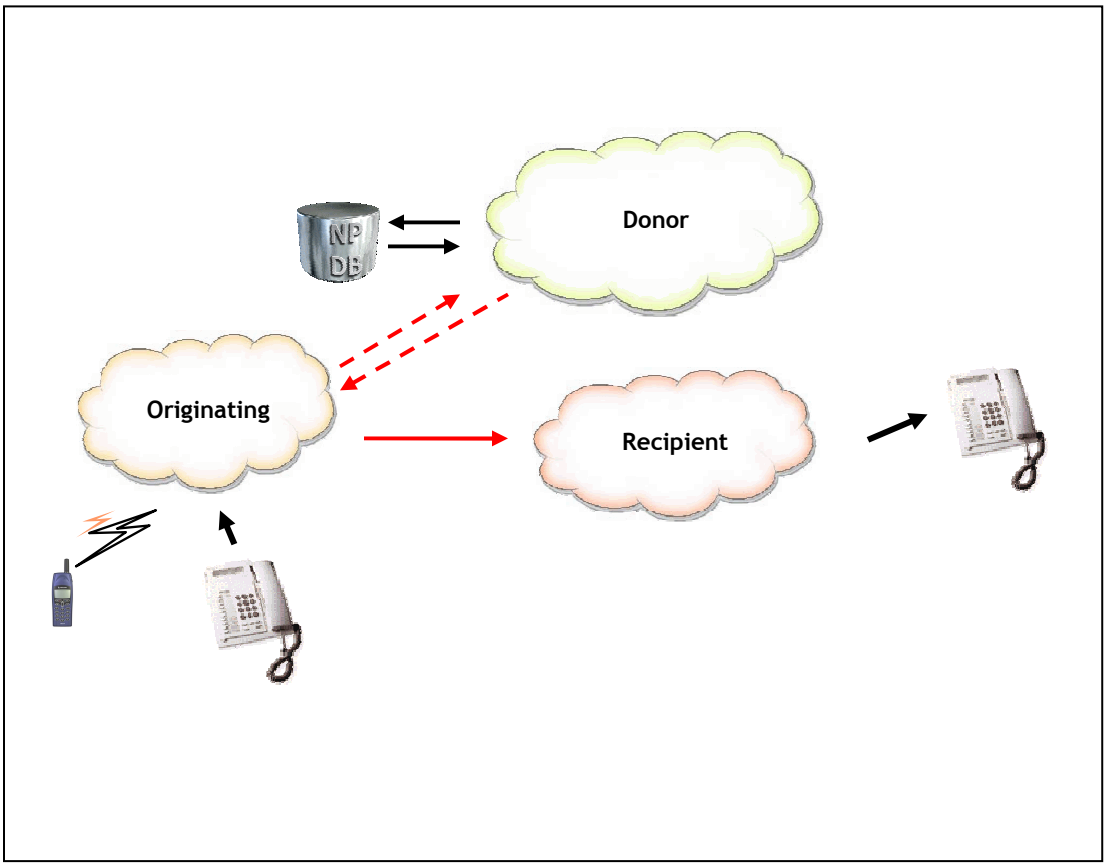
The call progression for the Query on Release method of routing calls to ported numbers uses a centralized database as follows[6] (Figure 2 refers):

1) The originated call is routed to the donor network for completion. If the called directory number is resident on the donor network, the call is completed
2) If however the called directory number has been ported, the donor network detects that and releases the call to the originating network with an indication that the number has been ported
3) The originating network queries its copy of the centrally administered Number Portability database
4) The routing information for the called directory number is provided by the Number Portability database to the originating network
5) The originating network completes the call to the appropriate network where the called number currently resides.

[6] www.ietf.org/rfc/rfc3482.txt

4.2.3 Call Drop Back (Fixed line application)

Figure 3



Source: Inter Connect Communications Numbering Master Class, Bath, England. 11-15 July 2005 Number Portability Basic Principles- Part 1 by Gary Richenaker

The diagram (Fig 3) shows the call progression for the Call Drop-back scheme for routing calls to ported numbers and uses a distributed database approach. This scheme is also known as "Return to Pivot (RTP)." The call progression is as follows[7]:

(1) The called directory number is routed from its originating network to the donor network.

(2) The donor network detects that the dialled number is no longer resident on its network and queries its internal Number Portability database.

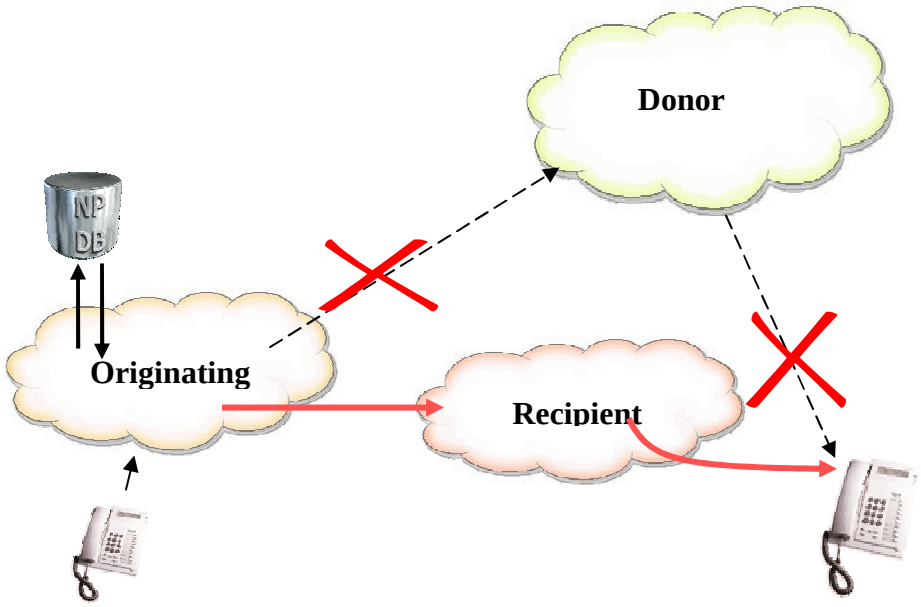
(3) The internal NPDB provides the routing number of the dialled number which is passed on to the originating network.

(4) The originating network uses the new routing number to complete the call

[7] www.ietf.org/rfc/rfc3482.txt

4.2.4 All Call Query (ACQ) - Direct Routing (Fixed Line application)

Figure 4



- Optimized routing
- No tromboning
- Minimal increase of network complexity
- Minimal signaling impact
- Minimal increase of call set up time
- Fail-safe if the donor operator goes out of business

Source: Inter Connect Communications Numbering Master Class, Bath, England. 11-15 July 2005 Number Portability Basic Principles- Part 1 by Gary Richenaker

In the ACQ scheme, the routing of a call to a ported number uses the centralized database approach and typically routes calls to ported numbers in the following manner.[8] (Figure 4)

1) The originating network, upon receiving the dialed directory number, queries the NPDB which may be a mirror of the centralized NPDB or provided by a third party

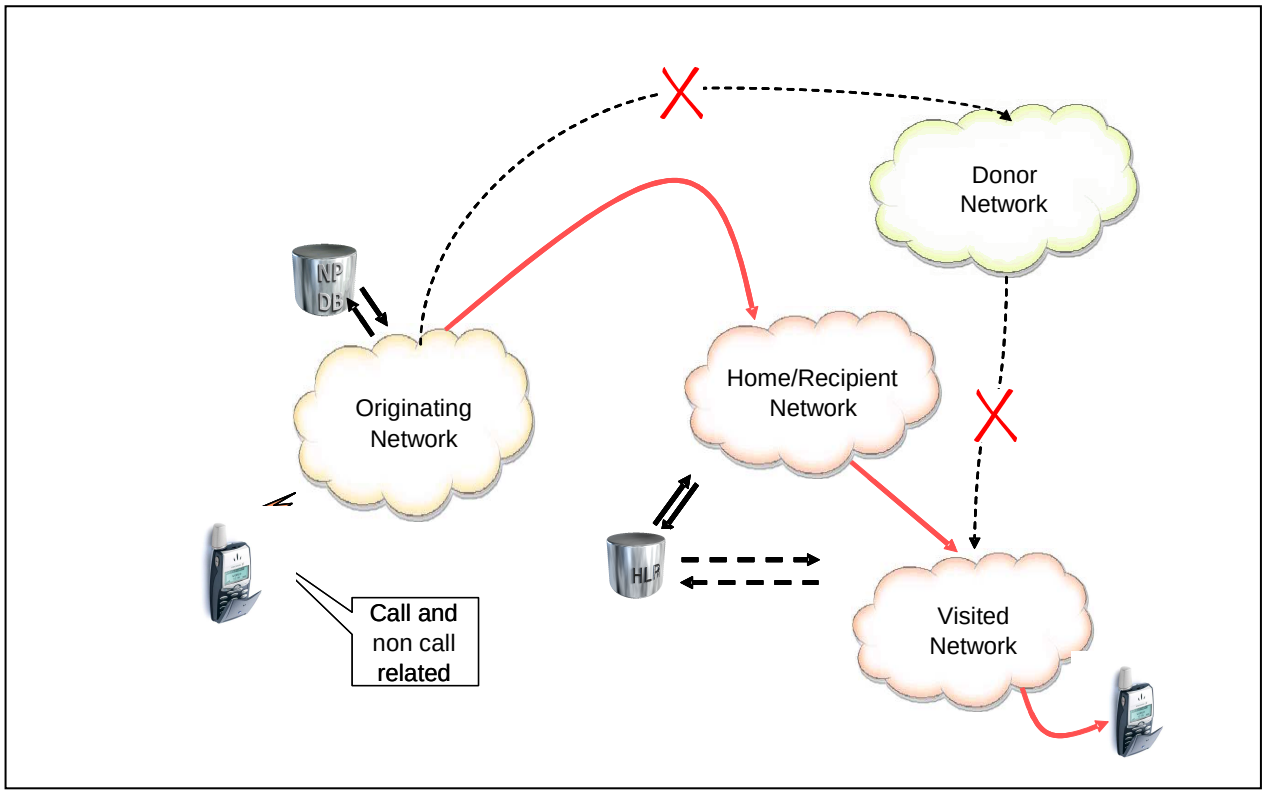
[8] www.ietf.org/rfc/rfc3482.txt

2) The NPDB sends the location routing number of the network on which the dialed number resides to the originating network. Whether the dialed number has been ported or not , the routing number of the network on which the dialed number resides is used to route the call.

It must be noted in the above illustration that the Donor network does not have to be queried for routing information as the NPDB is queried for routing for all originating call.

4.2.5 All Call Query (Mobile application)

Figure 5



Source: Inter Connect Communications Numbering Master Class , Bath, England. 11-15 July 2005 Number Portability Basic Principles- Part 1 by Gary Richenaker

Fig. 5 shows two (2) examples of a mobile call that is

1. routed to a ported mobile number on its new home network and
2. routed to a ported mobile number which is roaming

The call progression for example (1) is as follows:

a) The mobile phone initiates a call which is sent by its network to the centralized database (NPDB) to query routing information for the number called

b) Once the routing information is retrieved, it is used by the originating network to route the call to the new network on which the ported number now resides

The call progression for example (2) is as follows:

a) The mobile phone initiates a call to a ported number which is currently roaming
b) The initiating network sends the call to the NPDB to request routing information
c) Once the routing information has been received, the call is sent to the new network of the ported number
d) The new home network queries its Home Location Register (HLR) as to where the ported number is located and receives the information that the ported number is roaming and the routing information of the visited network
e) The call is passed to the visited network for completion

4.3 Popular method for implementation of Number Portability

Internationally, the All Call Query (ACQ) method of implementation is by far the most popular method.[9](Appendix 1) The Dominican Republic which launched Number Portability for both fixed line and mobile markets on September 30, 2009 chose the All Calls Query /centralize database mode of implementation. Some of the other methods have disadvantages such as longer call set up times and increased potential for call blocking[10]. The ACQ method however, provides direct routing from the originating network to the network to which the telephone number has been ported and does not have the disadvantages cited above. It is therefore the most efficient method of implementing Number Portability. The Regulator in Singapore, the Infocomm Development Authority of Singapore (IDA), when it introduced a centralized database for Number Portability stated : "*This is deemed more efficient and importantly beneficial for the telecom sector in the long run as it can better support more complex routings expected from the next-generation services and application*[11]*.*"

[9]http://www.erodocdb.dk/Docs/doc98/official/Word/ECCREP031rev1.DOC

[10] http://www.iec.org – web proforum tutorials.

[11] http://www.ida.gov.sg/News%20and%20Events/20050829134538.aspx?getPagetype=20

5 Proposed Implementation Plan for Number Portability in Trinidad and Tobago

5.1 Proposed option for implementation

The All Call Query (ACQ) method of implementation of service provider number portability has been shown to be the most popular mode of implementation in other countries (see Appendix 1). It is a direct routing method in that calls to ported numbers are sent from the originating network to the new network after the routing information has been obtained from the centralized database by the originating mobile network. While experience has shown that the set up costs for the ACQ option are higher than the other options shown, the long run operational costs are lower (see Appendix 3).

Statement of Purpose on option for service provider number portability

The Authority proposes that service provider mobile and fixed number portability be implemented using the All Calls Query direct call routing method.

The ACQ system requires a clearinghouse facility. The main function of the clearinghouse is to track and bill for the usage of the centralized database used for storing the routing information for numbers. The clearinghouse may also be responsible for the day to day running of the centralized database, its operational maintenance as well as keeping it updated.

5.1.1 Establishment of a clearinghouse

The clearinghouse facility provides for the collation of the quantity of database dips from the concessionaires and apportioning and preparation of the billing for same. It may also provide the centralized database facility on which the routing information for each working telephone number resides. It therefore has an integral part to play in the porting process and requires that concessionaires provide it with the necessary information to update its database.

The establishment of a clearinghouse can assume one of two options:

1. locally i.e. in Trinidad and Tobago or
2. externally

5.1.1.1 Locally based clearinghouse

A locally based clearinghouse may be established in either one of two ways:

1. Public domestic telecommunications concessionaires may collaboratively establish a clearinghouse (centralized database included)
2. A neutral third party may establish the clearinghouse and centralized database and manage all aspects of the porting of numbers.

Irrespective of the approach to the establishment of the locally- based clearinghouse, that clearinghouse shall:

- Determine, apportion and bill database usage charges for all concessionaires
- Establish the centralized database
- Update the database with location routing information when numbers are ported
- Assume responsibility for the maintenance of the database

In determining the best approach for locating the clearinghouse, the Authority considered the advantages and disadvantages of a locally based clearinghouse. These are identified here for ease of reference:

The advantages of a locally based clearinghouse considered by the Authority were:

1. It eliminates any possible influence that the politics, economics and policies of a foreign entity may exert upon the clearinghouse
2. It removes the requirement to increase capacity of international signaling network
3. It reduces the demand for foreign exchange as it eliminates the need to remit cost of database dips in relevant foreign currency
4. It may lower operational costs when compared to those of a foreign facility

The disadvantages of a locally based clearinghouse were:

1. Its high up front (establishment) costs
2. The long set up time
3. Time to conclude negotiations to satisfy all concessionaires may be long, which could delay the establishment of service provider mobile number portability.

5.1.1.2 Externally outsourced clearinghouse

In this option, the database service is outsourced externally to a third party in another country for all database dips and clearinghouse activities. Some countries have opted for this solution. E.g. Pakistan

In like manner to the local establishment of the clearinghouse, the Authority considered the advantages and disadvantages of an externally outsourced clearinghouse. These are identified here for ease of reference:

The advantages of an externally outsourced clearinghouse considered by the Authority were:

1. Its lower up-front capital (establishment) costs
2. It may be more cost effective in the long run, depending on take-up of service
3. Its shorter time to implement service provider mobile number portability\
4. It allows concessionaires to concentrate on administrative and technical issues to facilitate the implementation of number portability

The disadvantages of an externally outsourced clearing house considered by the Authority were:

1. It necessitated the need to increase the capacity of the international signaling network to accommodate database dips
2. The possible demand for foreign exchange given the need to pay the outsourced clearinghouse in the relevant foreign currency for the cost of database dips and contractual payments
3. It raises potential privacy and security concerns given that subscriber information needs to be given to a foreign third party

Based on the above, the Authority is of the view that an externally outsourced clearing house may be advantageous in the initial stages.

As knowledge and experience grows locally and implementation proves successful, the Authority would consider initiating relevant steps to establish the clearinghouse locally.

Statement on establishment of a clearinghouse

The Authority proposes that the clearinghouse for ported numbers be

a) outsourced to an international provider in the first instance and

b) established in Trinidad and Tobago at a later stage should it prove to be the more cost effective and efficient long term option

6 Cost considerations

There are two (2) broad categories of costs arising from the implementation of service provider number portability:

1. Establishment Costs: These are capital costs incurred by providers to make available the infrastructure to enable all users to port their telephone numbers
2. Consumption Costs: These are costs caused by users and incurred directly by telephone service providers in providing number portability.

6.1 Establishment costs

Establishment costs may be separated into the following categories:

1. Shared costs : these are costs to be shared among telephone service providers for commonly used equipment and facilities
2. Individual service provider costs: these are costs which individual telephone service providers incur to get their networks ready for number portability

6.1.1 Shared costs

The capital cost for the establishment of a centralized database and clearing house shall be shared by all telephone service providers since they will all be making use of it.

As stated previously, there are two (2) options for the establishment of a local clearinghouse and centralized database. There shall be components of shared costs depending on the local option chosen as follows:

1. The telephone service providers collaborate to form a local company to establish and supply clearing-house and centralized database functions,
2. The clearing-house and centralized database functions be supplied by a local company independently of the telephone service providers.

If, however, the clearinghouse and centralized database services are contracted to an overseas entity, there may also be some component of shared establishment cost to which each telephone service provider shall contribute.

6.1.2 Individual Service Provider costs

These costs may differ across concessionaires and include (but are not limited to) the following:

1. Upgrade of hardware and software of existing telecommunications network equipment to support number portability
2. Establishment of signalling routes between the concessionaires and the centralized database
3. Administrative support functions
4. Upgrade of existing operational support systems (OSS) to support number portability

6.2 Consumption costs

Consumption costs are the operational, maintenance and administrative costs associated with the operation of service provider number portability. Costs to support service provider number portability are incurred by:

1. Telephone service providers
2. The Centralized database and clearinghouse

6.2.1 Service Provider Costs

These are costs incurred by the service provider in the operation of service provider number portability. These costs[12] may be disaggregated into three (3) distinct categories:

1. Administrative cost which is the cost incurred each time a request is made for a number to be ported such as :
    a. Customer service representatives to receive requests
    b. Verification of subscriber requesting the port
    c. Coordination of the porting process

[12] The quantum of the costs will depend on whether the clearinghouse and centralized database are established locally or supplied by a foreign provider.

2. Per ported number costs

   Per ported number costs are incurred during the porting process and include but are not limited to:

   a. Modification of the donor and recipient's subscriber databases and centralized databases each time a number is ported;
   b. Modification of subscriber data in the network element;
   c. Issuance of activating a ported number, more so in the instance of a ported mobile number where a new SIM card must be issued;

3. Additional Signaling Costs:

   These include the costs associated with the use of signaling links, additional processing and IN resources to facilitate each data base dip within the All Calls Query scheme.

6.2.2 Clearinghouse and Centralized database costs

The operating costs for the clearinghouse and centralized data base are as follows:

1. Administrative cost each time a number is ported
2. Maintenance of the database and peripherals
3. Usage of the database each time a dip is made to find a location routing number

The option chosen from the possible afore-mentioned implementations in Section 5.1.1.1 and 5.1.1.2 will determine the quantum of these operating costs.

Statement of Purpose on costs

The Authority proposes that

1. *All concessionaires shall bear their own establishment costs to implement number portability in their networks.*
2. *All concessionaires shall contribute to the cost derived from the establishment of the centralized database and clearinghouse (whether locally established or outsourced overseas). These costs must adhere with the guidelines that the Authority may establish.*
3. *The consumption costs for operating number portability shall be borne by all concessionaires. These costs shall adhere with any guidelines that the Authority may establish.*

6.3 Costs to user

Number portability is a stimulus to competition and in order to encourage the supply and enjoyment of better service and benefits, the user should not have to pay directly for porting a telephone number. There will therefore be no fees to the user when porting their telephone number. The Authority recognizes that post paid mobile users have contractual arrangements with the concessionaires which will deter users from exercising their choice of concessionaire should there be large penalties for terminating a post paid contract before its expiration. The Authority's "Consumer Rights and Obligations" document provides guidelines for users wishing to break such contracts before their term has expired.

Statement of Purpose on costs to user

The Authority proposes that no charge shall be levied on users when porting their mobile and fixed telephone numbers.

6.4 Cost recovery

The Authority recognizes that the method of cost recovery has significant implications for the level and structure of charges which impact directly upon market development. However, while it is proposed that concessionaires bear their own costs to implement and provide service provider number portability, the Authority recognizes the need for concessionaires to be able to recover the relevant costs incurred from the establishment and operation of said portability.

However, in the recovery of costs, the Authority is firmly of the view that service providers be only allowed to recover reasonable and efficiently incurred costs. Therefore there are certain costs, except those of establishment of a clearinghouse and the per operator costs that can be determined using the Authority's Top-Down Long Run Average Incremental Cost (TD-LRAIC) Model. Concessionaires would be allowed to recover establishment cost through regulated charges as calculated using the TD-LRAIC model and non-regulated charges as determined by market and negotiating conditions (in the instance of the clearing house).

Consumption costs are driven by either the number of subscribers using the service, the number of calls including look-up, and the number of customers porting their number in the

respective instances of per-ported number costs, additional signalling costs and continuing administrative costs respectively. There are certain consumption costs that can be determined using the Authority's Top-Down Long Run Average Incremental Cost (TD-LRAIC) Model. In that instance, concessionaires would be allowed to recover those consumptions costs through regulated charges determined in accordance with the Authority's TD-LRAIC model. Other costs that cannot be determined by the TD-LRAIC model may be determined by market. The Authority would seek to review non-regulated charges to ascertain the presence of anti-competitive practices by concessionaires.

Statement of Purpose on cost recovery:

1. *Concessionaires shall be allowed to recover the relevant costs incurred from the implementation of service provider number portability.*
2. *Concessionaires shall recover those establishment and consumption costs that can be determined using the Authority's LRAIC model through approved regulated charges.*
3. *Concessionaires shall recover those establishment and consumption costs that cannot be determined by the Authority's model through market and negotiating conditions where applicable*
4. *The Authority would seek to review non-regulated charges to ascertain the presence of anti-competitive practices by concessionaires.*

7 Other issues

7.1 Critical success factors

The following critical success factors have been identified as being necessary for the success of Number Portability[13]:

- **Time to port**- the time taken between the request being made to port a number and the port being completed. This can range from hours to days depending on the country considered.(Appendix 1, Table 1).
- **Whether there is a cost to the customer** - This has been discussed in section 6.5 above.
- **Which telephone service provider the customer has to approach to initiate the port** – The user should not feel intimidated by his current service provider so it is the practice by a number of countries that the request for the port be made to the service provider to which the user is moving.
- **Publicity given**- raising the customer awareness of the porting facility- there should be a vibrant ad campaign to educate and advise users of their right to port a number and the procedure and costs if any. Public service advertising should be undertaken jointly by the concessionaires and the Authority.

7.2 Time to port

The time to port a number was identified as one of the critical success factors in introducing fixed line and mobile number portability. It is recognized that a cumbersome and/or lengthy procedure will deter customers from utilizing the facility. A short porting time will increase competition as users will be able to switch over to their preferred concessionaire without tedious and frustrating delays. The average time to port in Spain is 5 days and is expected to reduce to 24 hours in the near future[14]. In the US, the time to port a fixed line to a fixed line is currently four (4) business days. This has been mandated by the FCC to be reduced to one (1) business day from summer 2010. The time to port a mobile number is two and one half hours which is an

[13] http://www.sunriseconsultants.com/mnp.html

[14] http://ec.europa.eu/information_society/doc/factsheets/14thimplementation/14th-progress-report-es-final.pdf

industry agreed standard in the US. Ofcom in the UK mandated that the time to port numbers should be reduced from 5 days to 2 days with effect from April 1, 2008 with a further reduction to two hours from September 1, 2009.[15] Further examples of times to port are shown in Appendix 2.

Statement of Purpose on time to port

The Authority proposes that concessionaires implement a solution that supports a time to port fixed line and mobile numbers of within 24hours.

7.3 SMS service

SMS service is a feature enjoyed by all mobile users whether they are operating on their own network or roaming. It is the user's reasonable expectation that should they exercise their choice to port their mobile telephone number to a competing mobile network concessionaire that SMS service will be available on the new mobile concessionaire. Features enjoyed on one public telecommunications concessionaire's network should be available to ported users on the new public telecommunications concessionaire's network unless those features are not available on that network. SMS must be provided for ported mobile handsets in the initial implementation of service provider number portability.

Statement of Purpose on availability of SMS for ported mobile telephones

The concessionaires shall be required to provide SMS service to all ported mobile telephones.

7.4 Unlocking of mobile handsets

In accordance with the terms of a concession for the operation of a public telecommunications network and/or the provision of public telecommunications services, the Authority recognises that a concessionaire may wish to lock or otherwise restrict the use of terminal equipment to access only that concessionaire's network or service supplied to a user. In such a case, the

[15] http://www.ofcom.org.uk/consult/condocs/gc18review/statement/

concession provides that, upon the termination of the user contract for service, the concessionaire shall, free of charge, remove such lock or restriction.

Within the context of number portability, a mobile user who wishes to re-use his handset on the recipient network after porting his mobile telephone number may only re-use such handset after termination of his contract for service with the concessionaire of the donor network and after the handset has been unlocked or the restriction otherwise removed by that concessionaire.

It is noteworthy, however, that early termination of a user contract may be subject to a penalty in respect of any subsidy that might have been provided by the concessionaire to the user under or in connection with the contract. Therefore, upon termination of the contract, a user may be required to, for example, pay any difference in the cost of a handset that might have been provided to the user on a subsidized basis in accordance with the terms of the user contract.

Therefore, if a user wishes to port their mobile telephone number, the user may:

1. purchase a new mobile handset from the concessionaire of the recipient network; or
2. retain the handset formerly used on the donor network:
    i. upon termination of the user contract with the concessionaire of the donor network; and
    ii. after having the lock or restriction removed by the concessionaire of the donor network at no additional cost to the user; and
    iii. if applicable, after paying or otherwise satisfying any penalties that might arise in respect of any subsidies that might have been granted to the user under the contract of service on a pro rated basis.

Statement of Purpose on unlocking mobile handsets

The Authority proposes that

1. ***concessionaires shall remove , at no cost to the user, their lock code on mobile telephone handsets at the request of the user provided the contract term has expired***
2. ***Where the contract term has not expired, the concessionaire shall recover the cost of the mobile telephone handset on a pro rated basis***

7.5 "Off net" alert

When number portability is implemented, a user will not be able to distinguish between an "on net" call versus an "off net" on the basis of the prefix of the number. There must be a method to alert callers to ported numbers that "off net" costs apply to the call[16]. The methods used in other jurisdictions are:

- an alert tone
- an announcement
- user access to database of ported numbers

The Authority proposes that an announcement be used to alert the user of an "off net" call which will attract a higher tariff.

Statement of Purpose on tariff transparency

1. The Authority proposes that concessionaires must provide a method whereby users shall be alerted when the number dialed has been ported and a different tariff shall be applied to the call.

2. The originating network shall be required to provide the "off net" alert.

[16] http://www.erodocdb.dk/docs/doc98/official/pdf/ECCREP031rev1.PDF

7.6 Procedure for porting a telephone number

The domestic telecommunications concessionaires shall convene a committee to draft procedures for porting telephone numbers. All procedures must be submitted to the Authority for its approval prior to implementation. The procedure shall be guided by the following:

1) The user shall make his request for porting his telephone number to the concessionaire to which he intends to port his telephone number
2) The information required should be sufficient to clearly identify the user such as user name on the account, account number at the current concessionaire, current service address (for fixed line), billing address and any other information deemed pertinent by the concessionaires.
3) The process shall not expose the user to intimidation, persuasion or pressure from the current concessionaire to which he is connected when he applies for his telephone number to be ported
4) The process shall be simple and easily understandable
5) Users shall be advised that all outstanding bills must be cleared prior to their application for porting
6) The current concessionaire shall port the number within twenty four (24) hours. Delays may be incurred, only when the following conditions apply:
    - Non-payment of current bills
    - Non-payment of past bills
    - Unexpired contract term
7) The user shall have the lock code removed from their mobile telephone by the current concessionaire and pay any difference between the cost of the mobile telephone and the subsidized cost.
8) The user shall have minimal disruption in telephone service while the porting is in process and may have service from two concessionaires for a short while.
9) The user requesting that their number be ported shall be able to stop the process even though it has commenced.

8 Schedule for Implementation of Number Portability

The following schedule applies:

1. The Authority proposes that service provider mobile number portability be implemented in Trinidad and Tobago within six (6) months of publication of the final version of this document.
2. An implementation plan shall be developed by concessionaires to have service provider mobile number portability operational within the six (6) month timeframe. The Authority reserves the right to attend the concessionaires' planning/implementation meetings.
3. The Authority proposes that fixed line concessionaires upgrade their OSSs to afford service provider number portability within one (1) year of the final publication of this document. An implementation plan shall be developed by the concessionaires to have fixed line service provider number portability operational within the one (1) year timeframe. The Authority reserves the right to attend the planning /implementation meetings
4. Operational procedures shall form part of the implementation plan and shall be developed by the domestic telecommunications concessionaires. The operational procedures shall be applicable to the following areas:
    a. Inter-concessionaire procedures

       This document shall detail the procedures to be followed from the time the request for porting a telephone number is made to the time the port is completed. The inter-concessionaire operational procedures shall be approved by the Authority prior to their implementation. The Authority reserves the right to attend concessionaires' meetings on developing inter-working procedures.
    b. Concessionaire internal procedures

       This document shall detail the internal procedures within each concessionaire's operations that are required to effect the porting of a telephone number. The Authority shall review the concessionaires' internal operational procedures for conformity to best practices in the industry.

The operational procedures shall be completed in good time to meet the due dates for implementation of mobile and fixed line number portability as indicated in (1) and (3) above.

Appendix 1- Number Portability Implementation in Europe

The European Union

The method of implementation of Number Portability in Europe has not been consistent due to the network technology in use at the time of implementation. For example, six EU Member States have introduced Mobile Number Portability in different ways[17]:

France and the UK selected an on-switch solution as the longer term solution. The Netherlands bypassed using an interim solution and decided on a long term IN solution. Sweden and Finland have introduced an interim on-switch solution but intend to migrate to a long term IN solution. Germany has a number of technical solutions working in parallel.

It is to be noted that no English speaking Caribbean nation has introduced service provider number portability to date.

See Table 1 (below) for a list of countries in Europe where number portability has been implemented. It should be noted that service provider number portability has been the most popular form of implementation and the most popular method of implementation has been All Calls Query.

[17] Study on the cost allocation for Number Portability, Carrier Selection and Carrier Pre-selection- Final report for DGX111of the European Commission by Europe Economics and Arcome Vol.1 October 1999

Table 1[18]

Country	Type of database	Routing of fixed to mobile	Routing of mobile to mobile	Time to port	Type of portability
Austria	**Distributed**	**OR or ACQ**	**ACQ**	**3 wdays**	**Service provider**
Belgium	**Centralised**	**ACQ**	**ACQ & QoR**	**2 days**	**Service provider**
Croatia	**Centralised**	**ACQ**	**ACQ**	**5 days**	**Service provider**
Cyprus	**Distributed**	**ACQ**	**ACQ**	**14 days**	**Service provider**
Estonia	**Centralised**	**ACQ**	**ACQ**	**7wdays**	**Service provider**
Finland	**Centralised**	**ACQ**	**ACQ**	**5 wdays**	**Service provider**
France	**Centralised**	**Phase 1 OR Phase2 ACQ**	**Phase 1 OR Phase 2 ACQ**	**10 days**	**Service provider**
Germany	**Centralised**	**OR / ACQ**	**ACQ**	**4wdays+2**	**Service provider**
Hungary	**Centralised**	**ACQ / QoR**	**ACQ / QoR**	**14wdays**	**Service provider**
Iceland	**Centralised**	**ACQ**	**ACQ**	**10wdays**	**Service provider**
Ireland	**Centralised**	**OR**	**ACQ**	**2 hrs**	**Service provider**
Italy	**Centralised**	**ACQ**	**ACQ**	**5 wdays**	**Service provider**

[18] http://www.erodocdb.dk/Docs/doc98/official/Word/ECCREP031rev1.DOC (2005)

Lithuania	**Centralised**	**ACQ**	**ACQ**	**28 days**	**Service provider**
Malta	**Distributed**	**OR**	**ACQ**	**4hrs**	**Service provider**
Norway	**Centralised**	**ACQ**	**ACQ**	**7 days**	**Service provider**
Portugal	**Centralized**	**ACQ/QoR**	**ACQ/QoR**	**5-20 w days**	**Service provider**
Slovenia	**Centralised**	**ACQ**	**ACQ**	**5 wdays**	**Service provider**
Spain	**Distributed**	**OR**	**OR**	**5 days**	**Service provider**
Sweden	**Centralised**	**OR/ACQ**	**OR/ACQ**	**5 wdays**	**Service provider**
Switzerland	**Centralised**	**OR**	**OR**	**5 wdays**	**Service provider**
United Kingdom	**Distributed**	**OR**	**OR**	**2 wdays +1cal. week**	**Service provider**

Source: http://www.erodocdb.dk/Docs/doc98/official/Word/ECCREP031rev1.DOC (2005)

ACQ-All Call Query

OR-Onward Routing

QoR-Query on Release-

Appendix 2 Effects of Mobile Number Portability

Fig. 6 below shows the experience of some other European countries[19] after number portability was introduced.

Fig.6

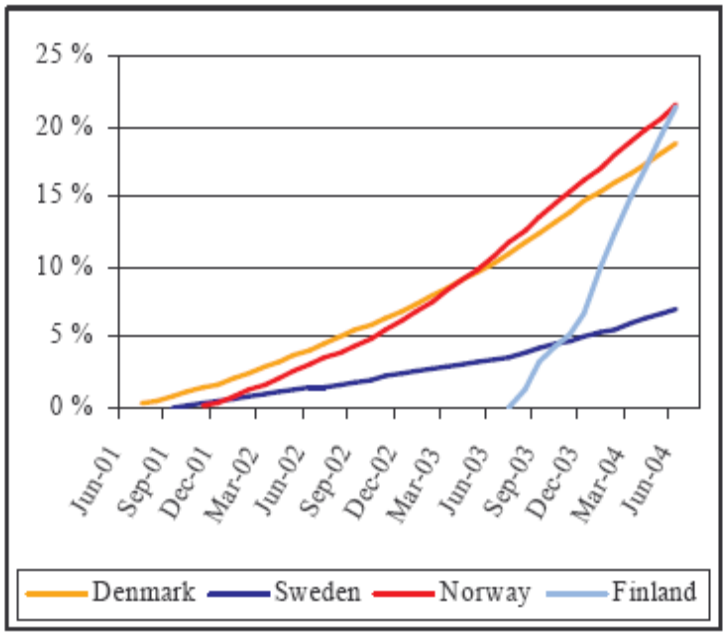


Figure 3: Cumulative number of ported mobile numbers as a percentage of total number of subscriptions, July 2001 – August 2004. (Source: Numpac 2004, SNPAC 2004, NPT 2004, ITST 2004)

The number of mobile ports attained 10% of their total subscriptions in Denmark and Norway two years after the implementation of Mobile Number Portability. However this was not the case in Sweden which achieved just 5% after two years. Finland on the other hand achieved over 20% churn in one year after Mobile Number Portability was introduced. This can be attributed to the regulatory environment in which the mobile operators were allowed to market their products.

[19] http://www.netlab.tkk.fi/opetus//s38042/s04/Presentations/06102004_Smura/Smura_paper.pdf

In Figure 7 below, it can be seen that prior to MNP in Finland, the churn rate was around 15%. After MNP, the churn went up to just over 30%. Some of the reasons for this increase in churn were as follows[20]:

- There was no cost to the user to port numbers
- The Regulator did not allow operators to subsidize handsets, market long term contracts or bundle mobile subscriptions
- Intense marketing campaigns were conducted

Fig.7 Churn rate in Finland

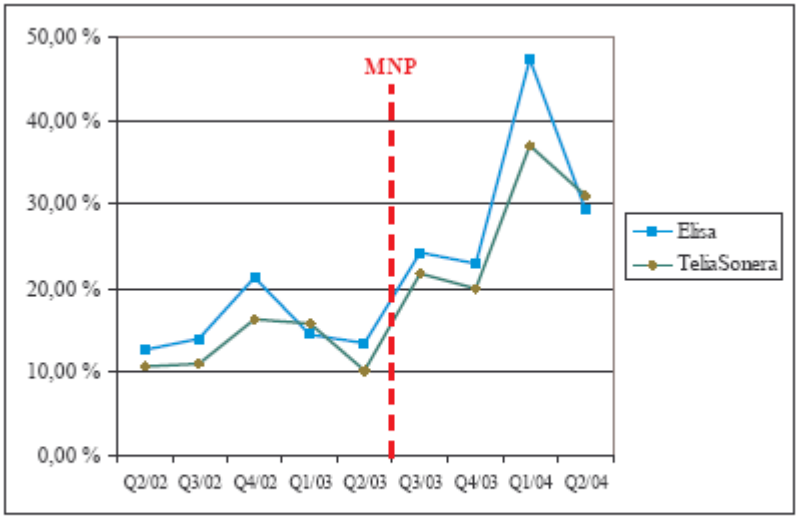


Figure 6: Churn evolution among the largest Finnish mobile operators

Source: http://www.netlab.tkk.fi/opetus/s38042/s04/Presentations/06102004_Smura/Smura_paper.pdf

[20] http://www.netlab.tkk.fi/opetus/s38042/s04/Presentations/06102004_Smura/Smura_paper.pdf

Appendix 3- Fixed line networks OSSs

Fixed line networks from incumbent PTTs (define or change-out) typically have older proprietary OSSs, customer care and billing systems. These systems are tightly integrated to the existing fixed line network and were never designed from inception to accommodate number portability. In some countries, an entire change-out of the fixed line OSS was necessary to accommodate number portability, which proved to be costly and time consuming to implement.

Appendix 4 - Number Portability database cost comparison

The centralized clearinghouse administration has been implemented in many countries due to its network efficiency and cost benefits over the long run. Figure 8 shows the relative costs for the models of implementation of Number Portability database administrations.

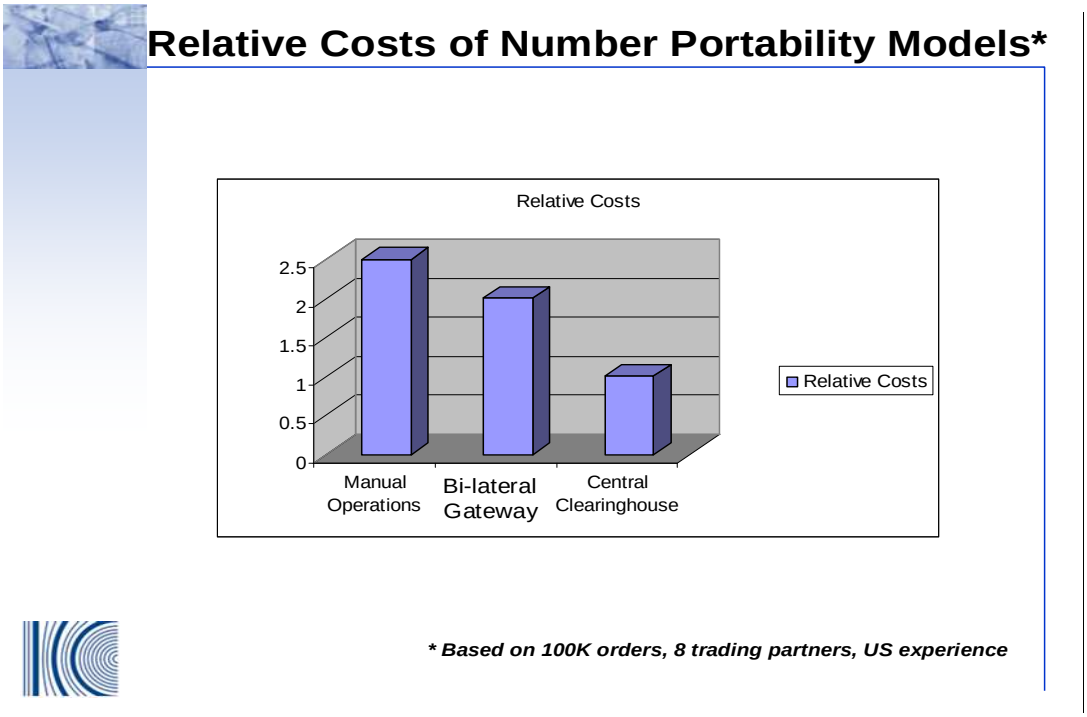


Fig 8 : Source: Inter Connect Communications Numbering Master Class , Bath, England. 11-15 July 2005 Number Portability Basic Principles- Part 2 by Naveen Suri

The centralized clearinghouse is a neutral third party who will handle all charges for database dips by the various concessionaires for calls made to ported numbers. They will more than likely host the database for ported numbers.

Appendix 5 - Costs incurred in provision of Number Portability

Table 2 – Costs Incurred in Provision of Number Portability

	System set-up cost	Per-operator set-up	Per-line set-up	Additional conveyance	Other administration
Number Portability					
On-switch solutions					
Costs involved	• Software evolutions in switches • Adaptation of information systems • Creation of inter-operator service management tools and procedures • Adaptation of maintenance and customer support procedures	• Initial programming of switches (except for 2nd number solution)	• Modification of subscriber data	• Tromboning and non-optimal routeing of calls	• Allocation of non-geographic numbers
Significance of costs	High proportion of total cost	Small proportion of total costs	Very small	Varies depending on technical solution: but can be quite high	Negligible
Main party incurring cost	The bulk of the costs will fall on the incumbent or donor network operator, although new entrants will also incur some costs	Low impact on the incumbent operator as well as other originating and transiting operators	Medium for the incumbent and low for other operators	High impact on the donor network operator and medium for others	Very low impact on the NRA
Off-switch solutions					
Costs involved	• Set-up of Intelligent Network • Adaptation of information systems • Creation of inter-operator service management tools and procedures • Adaptation of maintenance and customer support procedures	• Initial programming of switches • Access to national NP database	• Modification of subscriber data	• Additional conveyance of IN query	• Management of a national ported numbers database • Allocation of non-geographic numbers
Significance of costs	Significant proportion of total cost (higher than on-switch solutions)	Higher proportion of total costs than for on-switch solutions	Very small	Negligible	Very small
Main party incurring cost	High impact on all operators, but low on other operators	Medium impact on all operators	Medium impact on the incumbent and low on other operators	Very low impact on all call-originating operators	Very low impact on the NRA

Source: http://www.telecomsportal.com/Assets_papers/Number_portability/EC_Number_Portability_99.pdf

Appendix 6 – Offshore Clearinghouse

Countries using off shore third party database[21]

The following provides examples of countries that have opted to introduce service provider number portability by utilising an offshore solution for their clearinghouse:

1. EETT, Greek National Telecommunications and Port Commission awarded a number of portability contracts to Telcordia that enables Greece to fulfil its obligations to the EU directive 2002 on implementing Number Portability. Number portability is now available to 5.5 M fixed lines and 10 M wireless lines.
2. Lithuania selected Telcordia Clearing house solution for all licensed carriers to provide fixed line and wireless portability to 3M users.
3. Pakistan selected Telcordia Clearing house solution for Mobile Number Portability in 2007
4. Egypt uses Telcordia Clearinghouse solution for Mobile Number Portability in 2007. The NTRA provided number portability as part of the incentive for mobile operators bidding for the third mobile license in Egypt
5. Mexico quickly rolled out number portability for 98 million mobile and fixed line subscribers in less than 4 months in 2008

[21] www.telecordia.com/news_events/presskit