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Number Portability Task Force: PT4: Economic aspects

BIPT

Contents

1. Scope

The purpose of the document is to define the economic aspects related to Number Portability in Belgium.

The scope of PT4 is to build a general framework containing the economic considerations related to number portability. These economic considerations can be:

- General;
- Related to the economic evaluation of other PT's works;
- Related to specific questions asked to PT4 by other PT's, if any.

The aim of PT4 is not to come up with accurate estimates of costs related to number portability that could be shared between operators, or with accurate estimates of tariffs that could be paid by one operator to the other in the context of number portability, but try to come up with a consensus on the economic considerations related to the work topics hereafter enumerated.

2. References

[1] Number portability costs and charges. Determination and explanatory document. (January 1997) – OFTEL

[2] Non-geographic number portability costs and charges. Determination and explanatory document. (March 1998) – OFTEL

[3] Inquiry by the monopolies and mergers commission into telephone number portability, explanatory statement. (December 1995) – OFTEL

[4] Number portability: Modifications to fixed operator's licences. (April 1997) – OFTEL

[5] Technical options and costs for achieving number portability: final report. (October 1997) – Smith-Arcome

[6] Telephone number portability: a report on a reference under section 13 of the Telecommunications Act 1984 (14.12.95) ISBN 0-11-515451-5

3. Cost definitions

3.1. System set-up costs

System set-up costs means the one-off costs incurred by an operator and associated with the roll-out or extension of a number portability solution, or with the migration from one to another number portability solution.
These costs are related to all activities needed to establish the technical, operational and administrative capability to provide portability, such activities including development, implementation and initial testing. The costs are related to the Number Portability specific part of these activities. Such activities are, for instance:

- Network modifications and extensions (hardware and software)
  - Switch adaptations
    - Development costs
    - Roll-out costs
  - IN platform
  - Signaling network adaptations
  - Data adaptations and configuration
- Efforts spent on interworking with existing services
- Operational support systems modifications
  - Service provisioning functionalities
  - Configuration functionalities
  - Security management functionalities
  - Performance monitoring functionalities
  - Directory enquiries functionalities

  - Engineering management functionalities
  - Fault management functionalities
  - Billing functionalities
  - Inter-operator accounting functionalities
  - Account management functionalities
  - Customer information functionalities
  - Management information functionalities;
- Procedural and operational methods modifications, including training;
- Initial testing of the solution
  - Common field trials;
  - Internal trial.
- Project management costs
  - related to the above mentioned cost topics;
  - related to the project management for the NPTF

3.2. Reference [1]database set-up costs

Figure 1 illustrates the different number portability management layers that are identified in the framework of operator number portability.

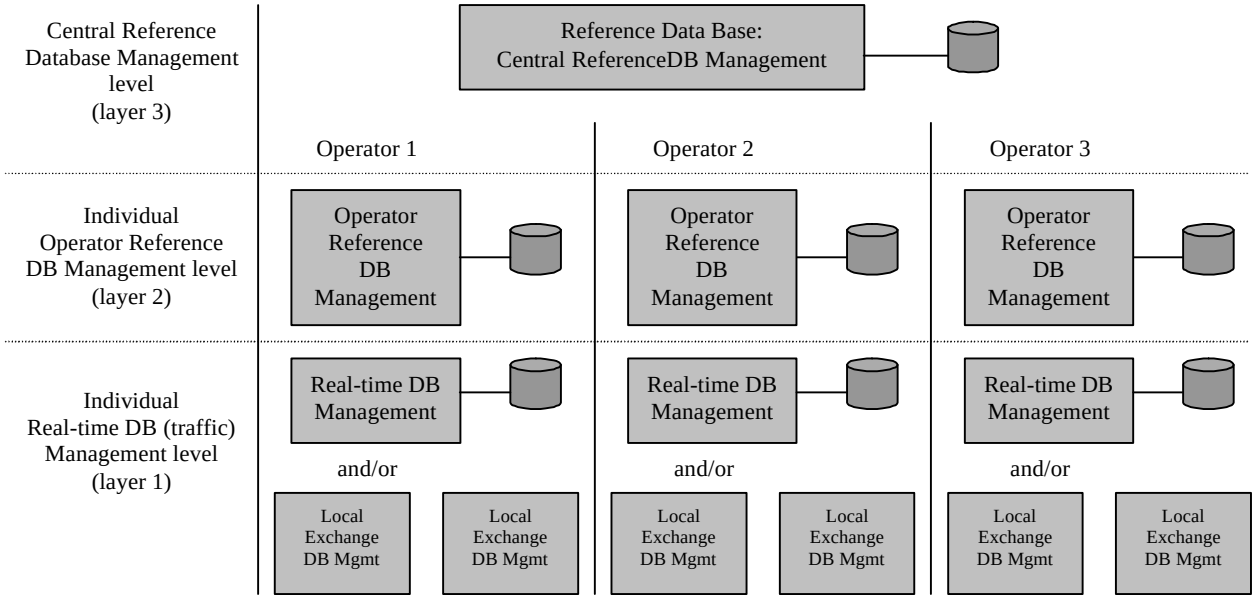


Figure 1 Number Portability management layers

These are the one-time costs related to the setting-up of the reference databases:

- In case of a “decentralized reference databases only” solution, these are the one-time costs related to the setting-up of these reference databases;
- In case of a “decentralized reference databases with existence of a central database” solution, these are the one-time costs related to the setting-up of both these decentralized databases and this centralized database.

3.3. Per line/number costs – not call related

The definitions here mentioned are applicable for subsequent orders of porting of a line, as well as for first order of a porting of a line:

- By “first order of porting”, we mean a request of porting made on a number to be ported-out from a NANO;

[1] The “decentralized reference databases with existence of a central database” has been developed as solution to implement number portability in Belgium.

- By “subsequent order of porting”, we mean a request of porting made on a number which has formerly been ported-out from a NANO, and which is either ported back to this NANO, or ported-out to another operator.

The definitions mentioned hereafter will apply[2] for the following cases:
- One number corresponding to one line;
- Multiple numbers corresponding to one line;
- Multiple numbers corresponding to multiple lines.

3.3.1. Per line/number set-up costs

The per line/number set-up costs are the costs of setting up each line/number for number portability and involve only those actions necessary to port the number. These costs relate to:

1. On the technical side:
   The activities in the network needed to execute the porting of such line/number.
2. On the operational and administrative side:
   The operational and administrative activities needed to execute the porting of such line/number.
3. On the databases side: the use of real time and reference databases:
   3.1. For the real-time databases (layer 1 in Figure 1): cost related to the update to be done into the network databases used for real-time call processing;
   3.2. For the reference database(s), two cases need to be distinguished:
      3.2.1. In case of a “decentralized reference databases only” solution: cost of the update to be done in these databases (layer 2 in Figure 1);
      3.2.2. In case of a “decentralized reference databases with existence of a central reference database” solution: cost of the update to be done in these databases (layer 2 in Figure 1) and cost of the update to be done in the centralized reference database (layer 3 in Figure 1).

3.3.2. Per line/number recurring costs

These are the recurrent costs specifically related to the fact that the line/number has been ported. These costs related to:

1. On the technical side:
   The cost related to the use of some capacity in a network for keeping track of the ported number, in order to be able to trigger the process allowing for the correct routing of a call made to this ported number.

2. On the database side[3]:
   2.1. For the real-time databases (layer 1 in Figure 1): recurrent cost of running the real-time databases (layer 1 in Figure 1), per entry, related to the maintenance of the integrity, management and administration of the database;
   2.2. For the reference database(s), two cases need to be distinguished:
      2.2.1. In case of a “decentralized reference database only” solution: recurrent cost per entry of running the decentralized reference databases (layer 2 in Figure 1), related to the maintenance of the integrity, management and administration of these databases.
      2.2.2. In case of a “decentralized reference database with existence of a central reference database” solution: recurrent cost per entry of running the decentralized reference databases and the central reference database, related to the maintenance of the integrity, management and administration of these databases

3.4. (Average) porting conveyance costs

Average porting conveyance costs are the costs of transiting a call between an originating and recipient network that are incurred by a serving network (which is not the originating network), in case where this serving network not only ensures the function of providing the correct routeing information in order to route

[2] Apply means in this context that a different cost could be associated with the different actions or activities.
[3] The “decentralized reference databases with existence of a central database” has been developed as solution to implement number portability in Belgium.

a call correctly from an originating network to a recipient network, but also acts as a transit network for conveying the call to the ported-out number.

3.5. Additional conveyance costs

Additional conveyance costs are the costs:

- Incurred by a donor operator, for the conveyance of a call originated on its network and destined to a ported-out number originally connected to its network;
- Additional compared to the costs of a call to a non-ported number allocated to the recipient operator and located in the same area as the ported-out number.

The additional cost concerned is the cost related to the additional network resources used in

- Switching capacity;
- Transmission capacity;
- Signaling capacity.

for the conveyance of the call to the ported-out number.

3.6. Routeing information retrieval costs

These are costs:

- Related to an off-switch solution making use of IN (database query, signalling, …);
- Additional compared to a call for which no operator portability related off-switch query is made;
- Which have not been taken into account in the definitions of additional conveyance costs and are mainly related to the performance of an IN query necessary to retrieve the correct routeing information for a call to a ported-out number.

4. Cost identification principles

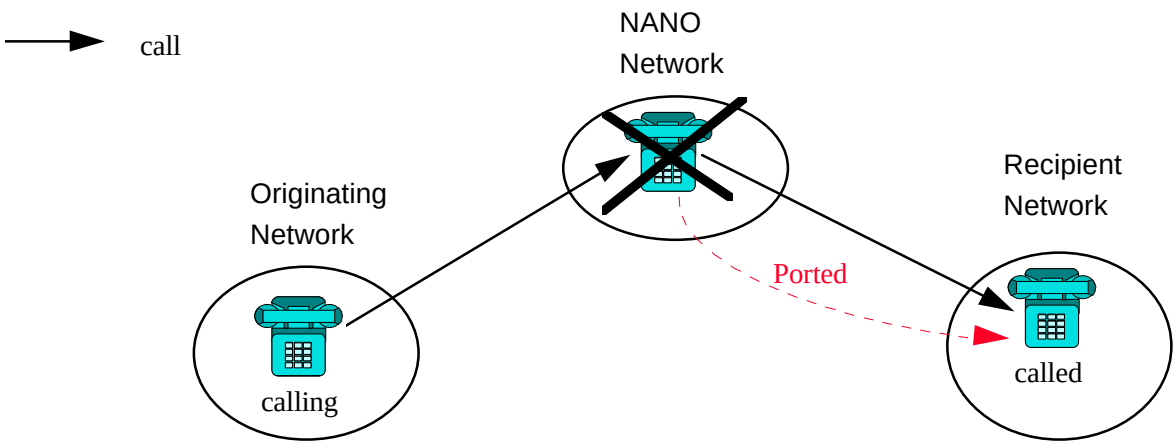
4.1. Definitions

4.1.1. Off-net and on-net calls

By **off-net call,** we mean a call towards a number that has been ported-out from the NANO network to a recipient network, where the NANO network **is not** the originating network.

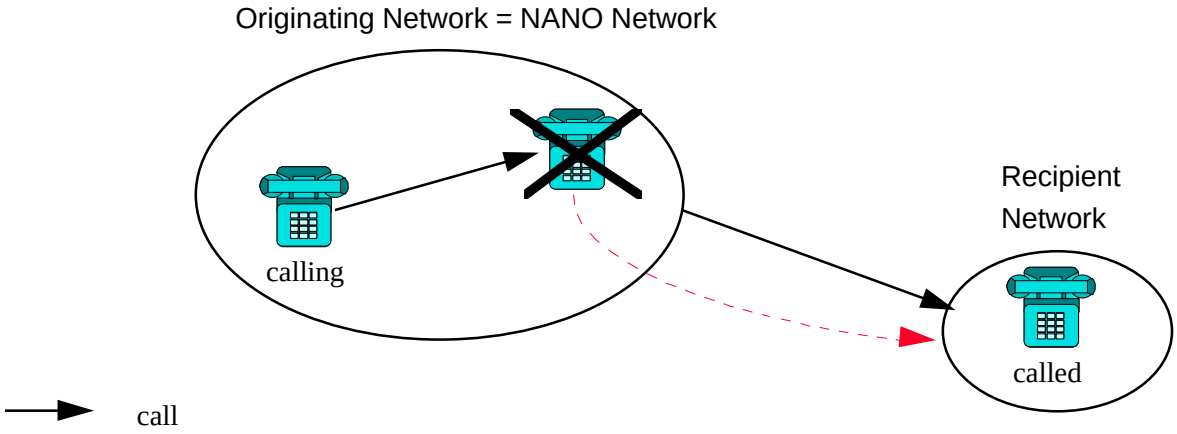
For the sake of clarity, it is mentioned that this case also covers the situation whereby the originating network and the recipient network are the same (case of OR used by the originating network operator).

Graphically:



By **on-net call**, we mean a call towards a number that has been ported-out from the NANO network to a recipient network, where the NANO network **is** the originating network.

Graphically:

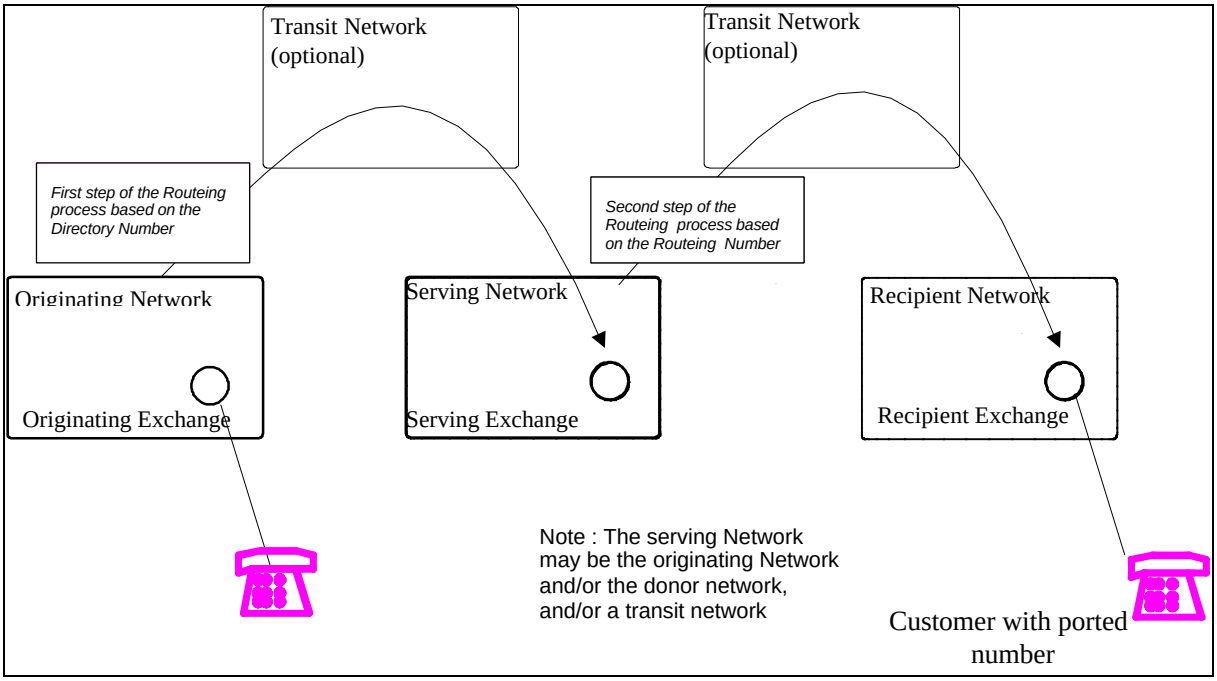


4.1.2. Functionalities.

PT1 has defined the activities, functionalities and functions performed by the different network operators involved in operator portability call handling process. These functionalities defined in PT1 deliverable will apply to PT2 scenarios. However, some other functionalities appearing in PT2 scenarios have not been defined yet by PT1: these are the transit functionality and possibly the additional conveyance functionality. We illustrate this hereafter by some generic cases of OP call handling process (not necessarily exhaustive).

- ***Off-net calls :***

  The general philosophy in number portability discussions is not to impose any technical solution in the network of any operator taking part in number portability procedures. This means that, depending on the technology chosen by the operators involved in the call handling process, the following scenarios can happen (non exhaustive list, based on figure 1 of PT1 deliverable):



1) **First scenario :** The originating network operator not only chooses to ensure the first step of the Routeing process based on the Directory Number, but also ensures the second step of the Routeing process based on the Routeing Number.

◊ In that case, the *originating network* operator will act as a serving network and will have to perform the following functionalities :
- *the Call Trap Functionality;*
- *the Database Query Functionality;*
- *the Routeing Information Addition Functionality;*
- *the Range Analysis Functionality.*

◊ Originating network operator also possibly incurs additional conveyance costs in the call handling process to the ported number. We will say that originating network possibly performs an ***additional conveyance functionality*** corresponding to this additional conveyance cost.

2) **Second scenario :** The originating network operator chooses only to ensure the first step of the Routeing process based on the Directory Number, and outsources some or all serving network functions to a third party network operator.

◊ In that case, a *third party network* will act as serving network and perform (reference being made to the terms and definitions of PT1) :
- *the Call Trap Functionality;*
- *the Database Query Functionality;*
- *the Routeing Information Addition Functionality;*
- *the Range Analysis Functionality.*

◊ The serving network operator can also possibly be implicated in the call handling process as a transit network, if the originating network chooses to use the serving network as such. In this case, the serving network incurs an average porting conveyance cost. We propose to name this transit functionality performed by the serving network operator, the ***transit functionality.***

◊ NB : in this scenario, the originating network operator does not incur any additional conveyance cost.

- ***On-net calls :***

◊ In that case, the *originating network* will act as serving network, and will perform the following functionalities (reference being made to the terms and definitions of PT1) :
- *the Call Trap Functionality;*
- *the Database Query Functionality;*
- *the Routeing Information Addition Functionality;*
- *the Range Analysis Functionality.*

◊ Originating network operator also possibly incurs additional conveyance costs in the call handling process to the ported number. As said before, we define ***an additional conveyance functionality*** corresponding to this cost.

4.2. Identification of traffic related costs incurred by each type of operator in the different call scenarios

For the transmission of the routing information in the graphs in this section, reference is made to section 5. For the functionalities performed, reference is made to paragraph 4.1.2.

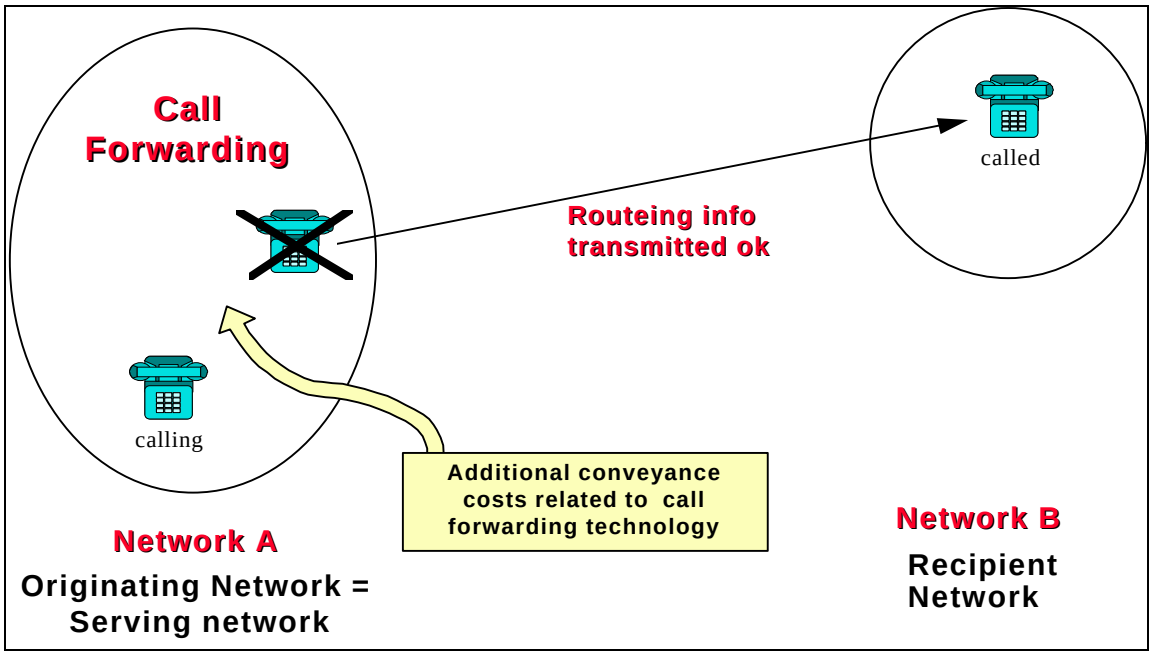
4.2.1. Scenario one: originating network = serving network >< recipient network

A) Costs incurred by network A.

A.1. Network A implements call forwarding.

In that case, network A may incur additional conveyance costs related to call forwarding technology (depending on its network structure), but does not incur routeing information retrieval costs.

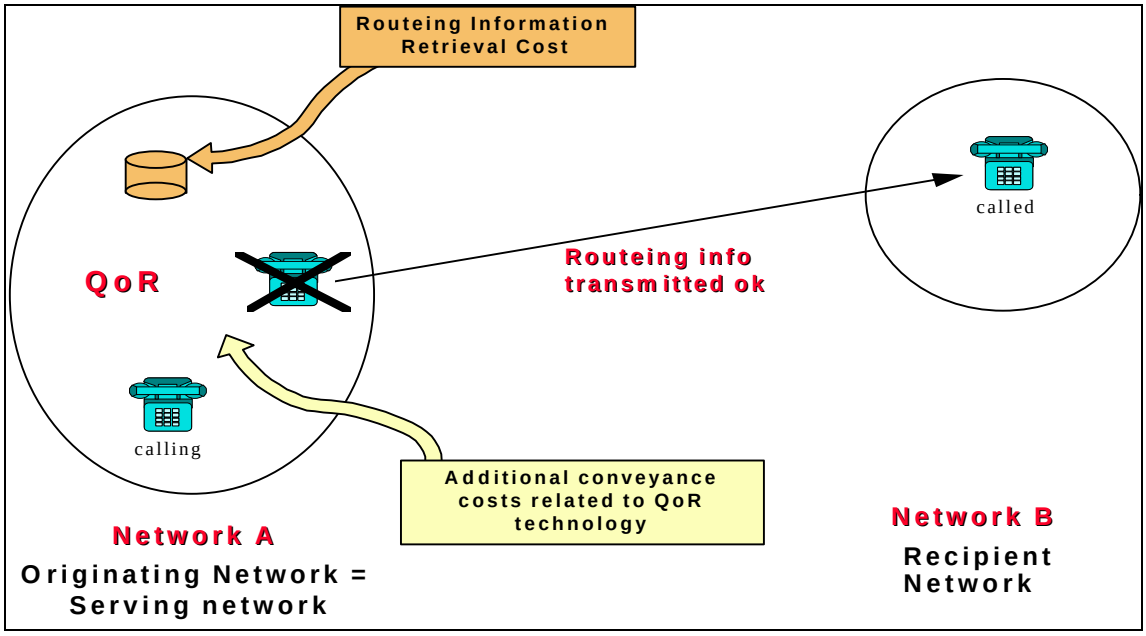
If additional conveyance costs do exist, they are incurred each time a call is made towards a ported-out number.



A.2. Network A implement QoR.

In that case, network A incurs additional conveyance costs related to Query on Release technology and routeing information retrieval costs. These costs are incurred by the serving network each time a call is made towards a ported-out number.

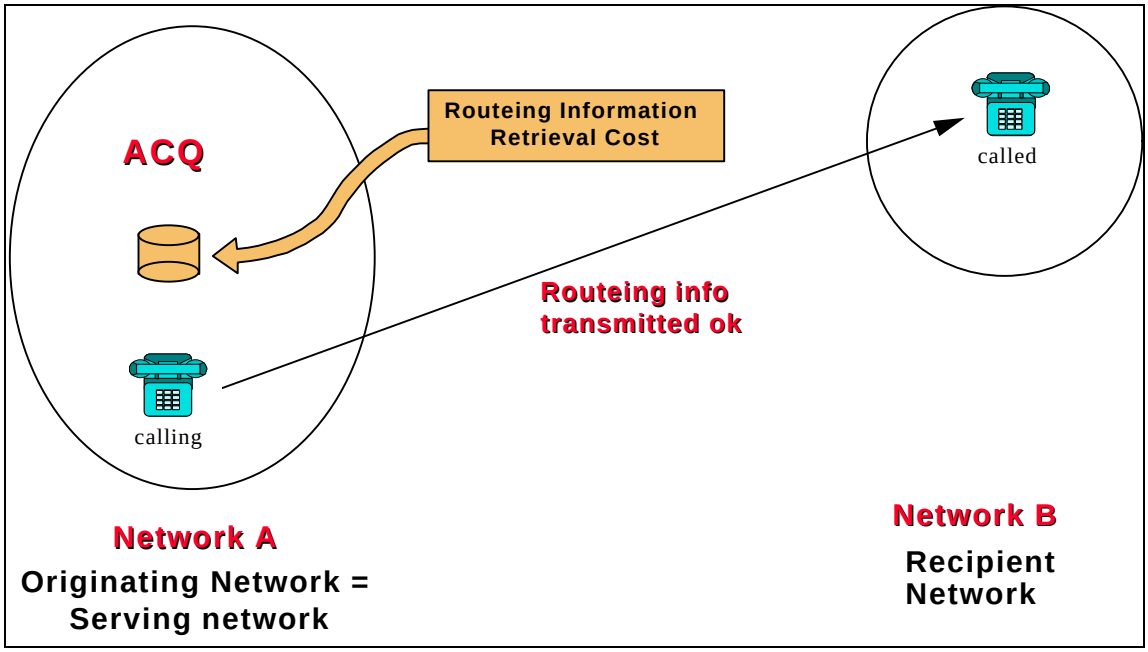
Graphically :



A.3. Network A implements ACQ within its network (also called : Query on Digit).

In that case, network A incurs routeing information retrieval costs. These costs are incurred each time a call is made from network A towards a ported number.

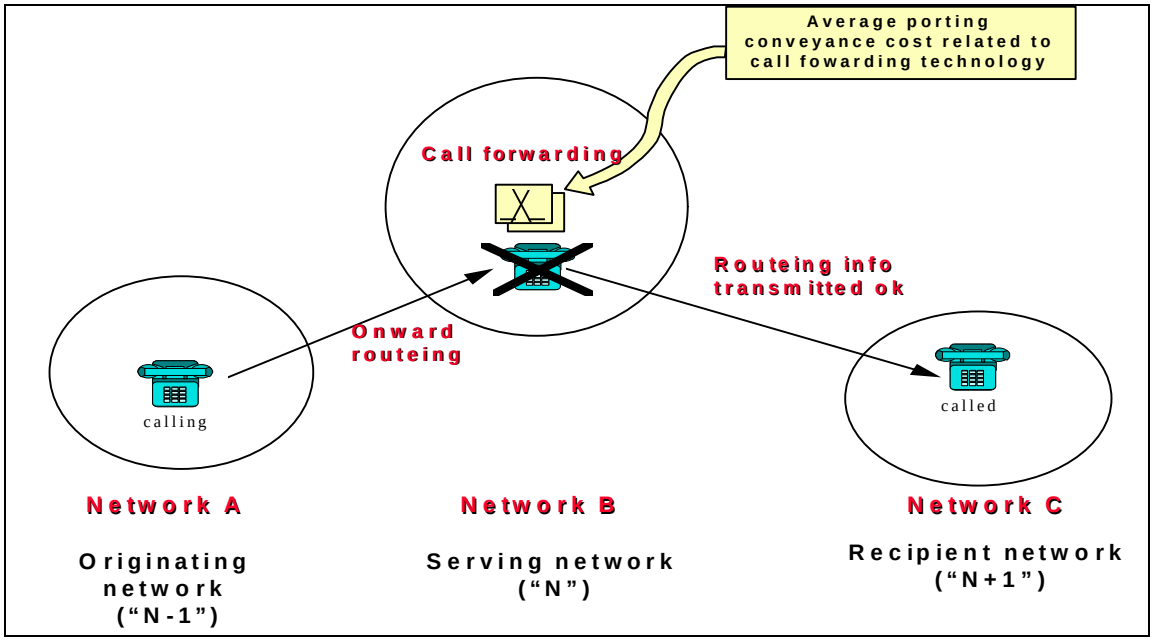
Graphically:



4.2.2. Scenario two: originating network >< serving network >< recipient network

A) Network A implements onward routeing and network B implements call forwarding.

Graphically :

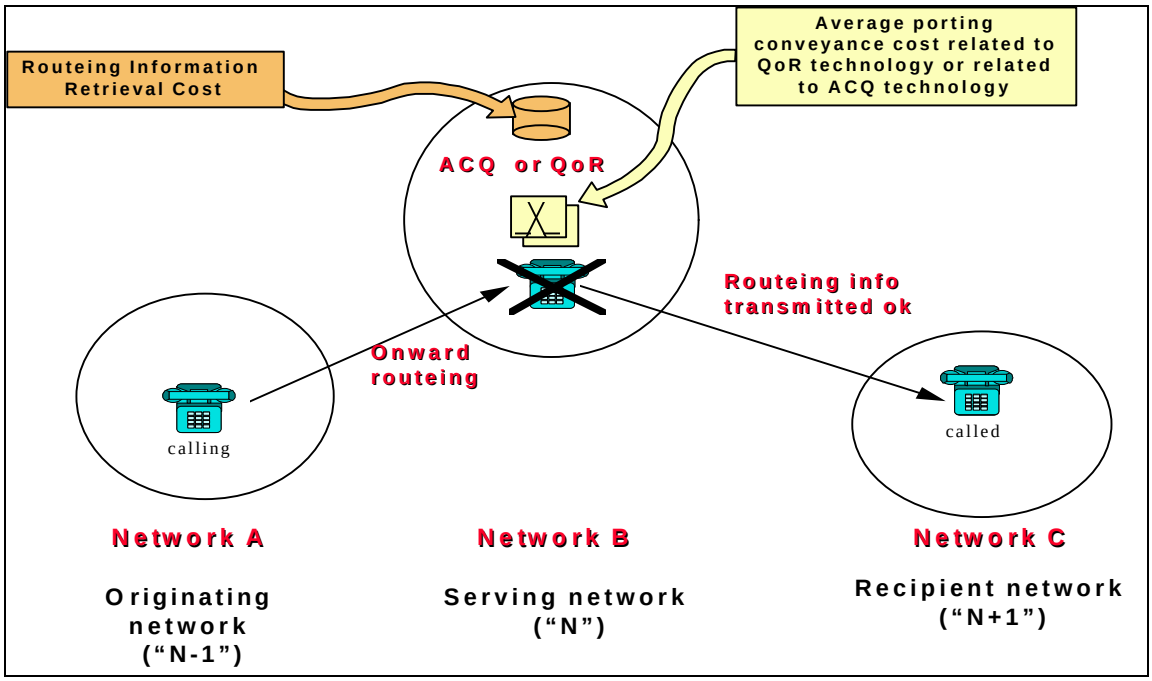


Network A, having opted for onward routeing, does not incur any number portability specifically call related cost.

Network B, having implemented call forwarding, will incur average porting conveyance costs related to call forwarding technology.

B) Network A implements onward routeing and network B implements Query on Release or All Call Query.

Graphically :



Network A, having opted for onward routeing, does not incur any number portability specifically call related cost.

Network B, having implemented an off-switch solution, will incur an average porting conveyance cost (related either to QoR or to ACQ technology), and also a routeing information retrieval cost.

4.2.3. Scenario three: serving network >< originating network = recipient network

This scenario does not differ fundamentally from scenario two, except for the fact that recipient network is now the same as originating network.

5. Cost sharing considerations related to information delivered by the serving network on the interface.

The functions performed by one network (let's say "N" network) will differ significantly depending on choices made by preceding networks ("N-1,..." networks) in the call handling process.

Taking into account this impact, the following principle is *proposed*:

Taking into account the fact that two options do exist for sending information over the interface, cost sharing structure for OP should be designed in order to give preeminence of choice to each party, for the information desired by this party for ***incoming*** *calls on its network.*

The proposed rationale of this principle is explained hereunder.

5.1. Recipent network and serving network do not agree on the format of the information for incoming calls made towards ported-in numbers

When the serving network (or more generally the “N-1” network) does not communicate the “C” RN + DN (RN corresponding in fact to the information collected by means of the serving functionality performed by this network) to the recipient network (more generally the subsequent network, or “N” network), whereas recipient network (“N”) has required the format “C” RN + DN, this may have a major impact on the costs incurred by the recipient (or subsequent “N”) network since:

1.1) recipient network (“N”) may be obliged (because the serving network does not send the requested format) to perform the same functions as those already performed by the serving network (“N-1”), namely :
- the Call Trap Function (CTF);
- the Database Query Function (DQF);
- the Range Analysis Function (RAF).

1.2) recipient network (“N”) may be obliged to perform these functions not only for calls to ported numbers (which is one of the options open for “N-1” network) but for all incoming calls from the considered “N-1” network;

1.3) from the cost point of view, this solution will imply a substantial increase of the concerned costs incurred for the call handling process : indeed, duplication of queries will appear, on the one hand, and queries will have to be applied to substantially much more calls, on the other hand.

1.4) such solution could also diminish the level of quality of the service provided to the final customers, by increasing the average setup time of calls.

5.2. Recipient network and serving network agree on the format of the information for incoming calls made towards ported-in numbers

When the serving network (or more generally the “N-1” network) communicates the information collected by means of the serving functions performed to the recipient network (“N”):

2.1) recipient network (“N”) will not have to perform the same functions as those already performed by the serving network or “N-1” network (namely the Call Trap Function (CTF), the Database Query Function (DQF), the Range Analysis Function (RAF));

2.2) recipient network (“N”) will not have to perform those functions anymore for calls which are made to ported numbers.

5.3. Proposed conclusion

This leads to the conclusion that in case where a “N-1” network should decide to only pass the DN information through the interface, whereas “N” network has required “C” RN+DN, “N-1” network should pay back the “N” network for the supplementary costs incurred by “N” network as a result of this choice, namely: the costs of the queries performed by “N” network for all incoming calls on “N” network stemming from “N-1” network.[4]

This settlement principle allows to give incentive to operators to move towards more cost efficient solutions, and gives disincentives to operators to choose solutions which will have a damaging and negative impact on the level of costs incurred by other operators involved in the OP call handling process.

[4] No unanimous decision was reached on this principle.