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Number Portability Task Force: NG-PT4: Economic aspects

BIPT

Contents

1. Scope

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

The scope of PT4 is to build a general framework containing the economic considerations related to non geographic 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 non-geographic number portability that could be shared between operators/service providers, or with accurate estimates of tariffs that could be paid by one operator/service provider to the other in the context of non-geographic 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 licenses. (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. Definitions

3.1. General definitions

3.2. Cost definitions

3.2.1. 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 non-geographic number portability solution, or with the migration from one to another non-geographic 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 Non-geographic 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

3.2.2. Reference [1]database set-up costs

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

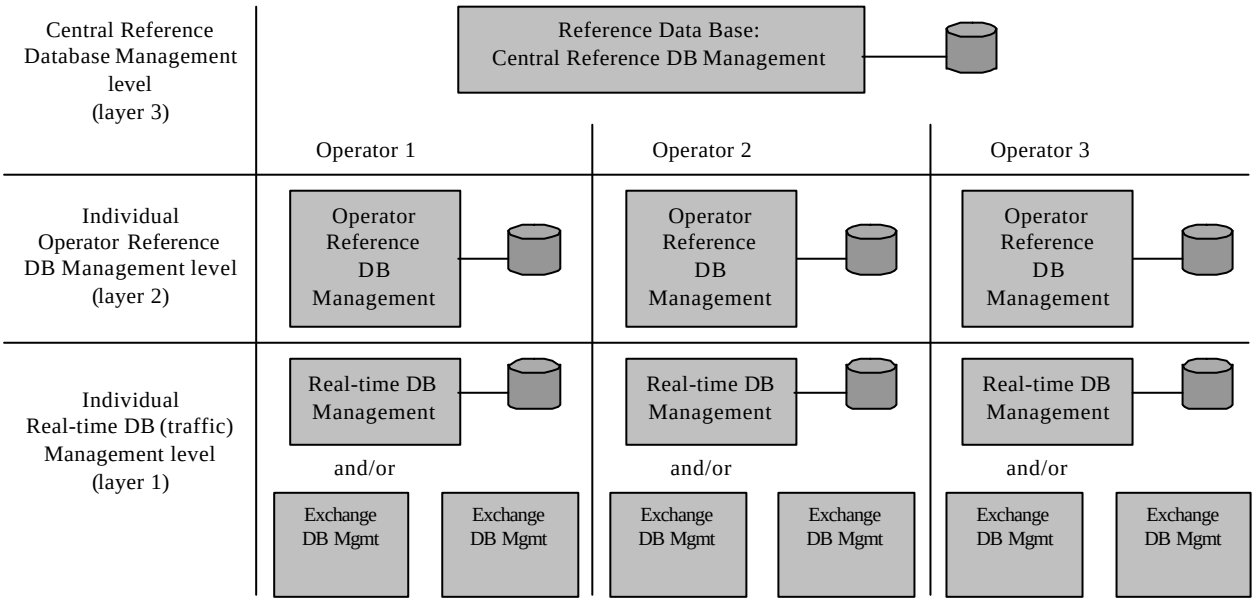

Figure 1 : Non-geographic number portability management layers

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

- A “decentralized reference databases with existence of a central database (CRDB)” solution will be used.These are the one-time costs related to the setting-up of both these decentralized databases and this centralized database.

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

3.2.3. Per number costs – not call related

The definitions here mentioned are applicable for subsequent orders of porting of a non-geographic number, as well as for first order of a porting of a non-geographic number:

- By “first order of porting”, we mean a request of porting made on a non geographic number to be ported-out from a NASP;
- By “subsequent order of porting”, we mean a request of porting made on a number which has formerly been ported-out from a NASP, and which is either ported back to this NASP, or ported-out to another service provider.[2]

3.2.3.1. Per number set-up costs

The per number set-up costs are the costs of setting up each number for non-geographic 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 number.
2. On the operational and administrative side:
   The operational and administrative activities needed to execute the porting of such number.
3. On the database 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 “decentralized reference databases with existence of a central reference database” : 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).

3.2.3.2. Per number recurring costs

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

1 On the database side[3]:

1.1 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;

1.2 For the “decentralized reference database with existence of a central reference database”: 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

3.2.4. (Average) porting conveyance costs

Average porting conveyance costs are the costs of transiting a call between an originating network and recipient platform that are incurred by a serving platform (which is not the originating network), in case where this serving platform not only ensures the function of providing the correct routeing information in order to route a call correctly from an originating network to a recipient platform, but also acts as a transit network for conveying the call to the ported-out number.
This cost is only incurred in case where Onward Routing is continued up to the Donor service provider platform.

[2] The costs of porting a non-geographic number back to the NASP are not necessarily the same costs as for subsequent porting.

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

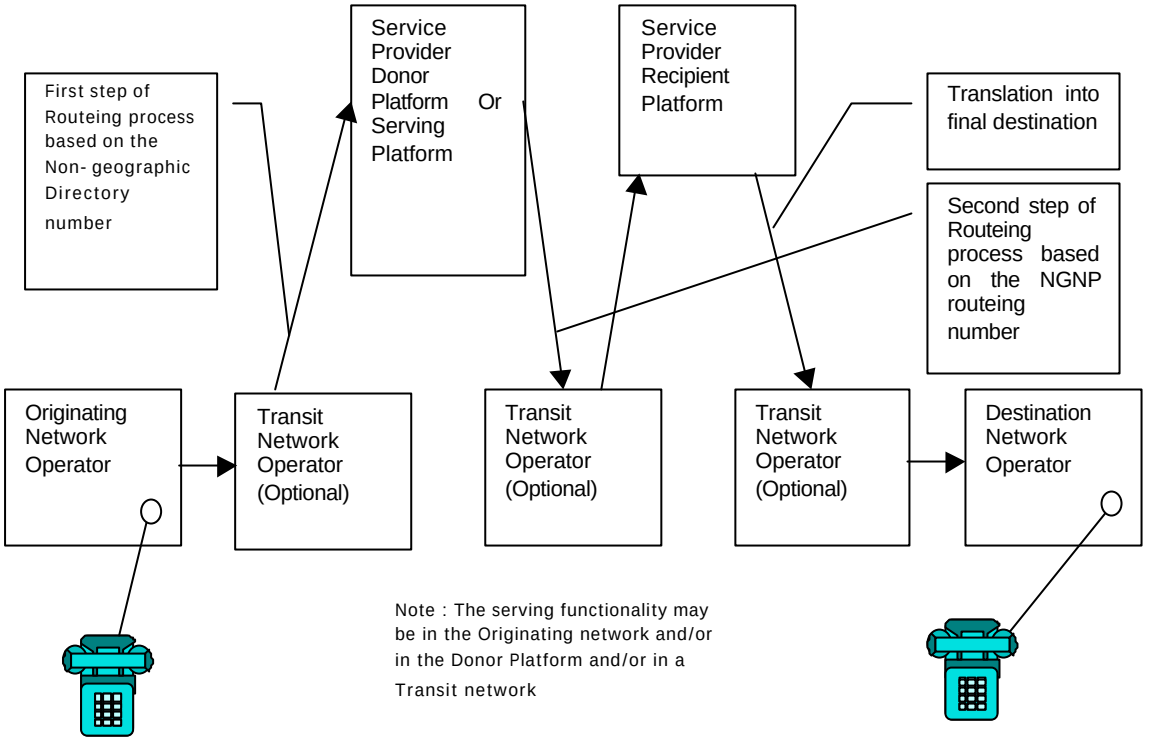

Figure 2 : Non-geographic number portability reference architecture

3.2.5. Additional conveyance costs

Important note : After analysis of the scenarios, it has been stated that the additional conveyance cost is not applicable for the non-geographic number portability.

Additional conveyance costs are the costs:

- Incurred by a donor service provider, for the conveyance of a call originated on its network and destined to a ported-out number originally connected to its platform;
- Additional compared to the costs of a call to a non-ported number allocated to the recipient operator/service provider.

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

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

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

3.2.6. Non-geographic Number Portability 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 non-geographic operator portability related off-switch query is made;
- Which have not been taken into account in the definition 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 NASP to a service provider recipient platform, where the NASP **is not** the originating network.
Whereas a NASP is not necessarily a network operator.

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

Graphically:

Case one : the NASP is a network operator

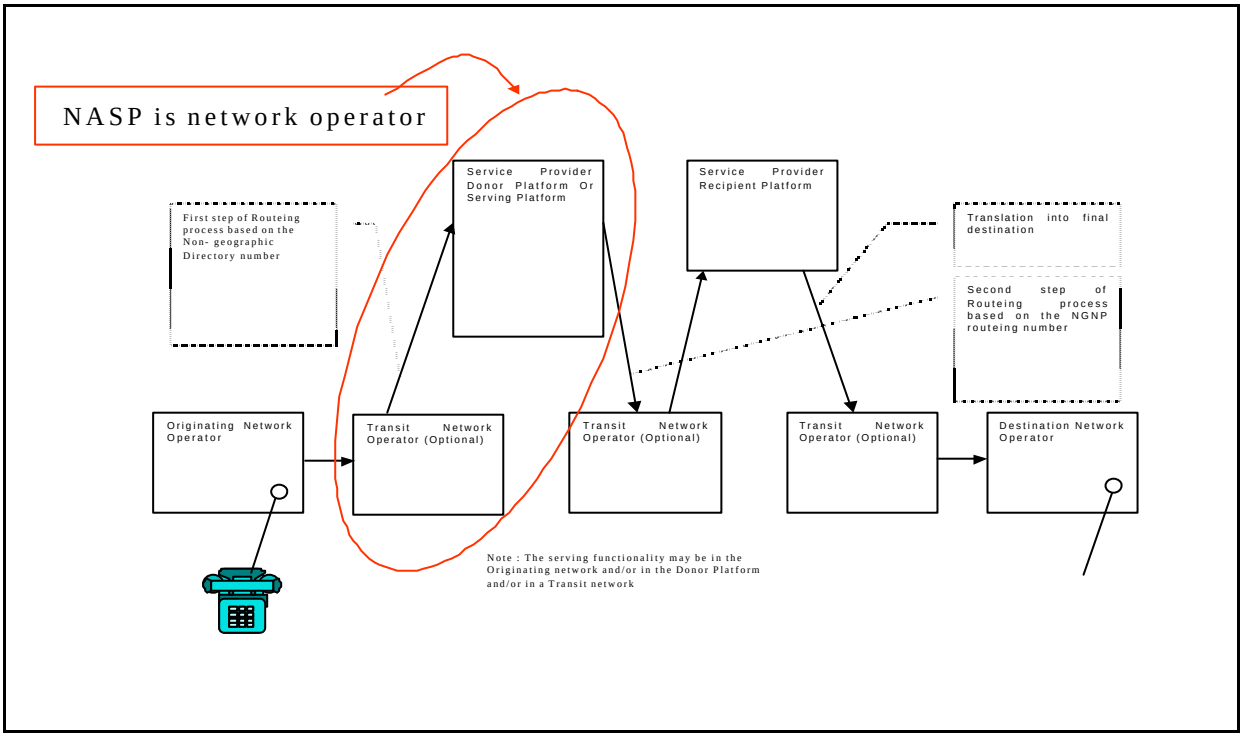

Figure 3 : Off-net call with NASP being a network operator

Case two : NASP is not a network operator

Case 2.1 : originating network is a network having a direct interconnect link with the NASP

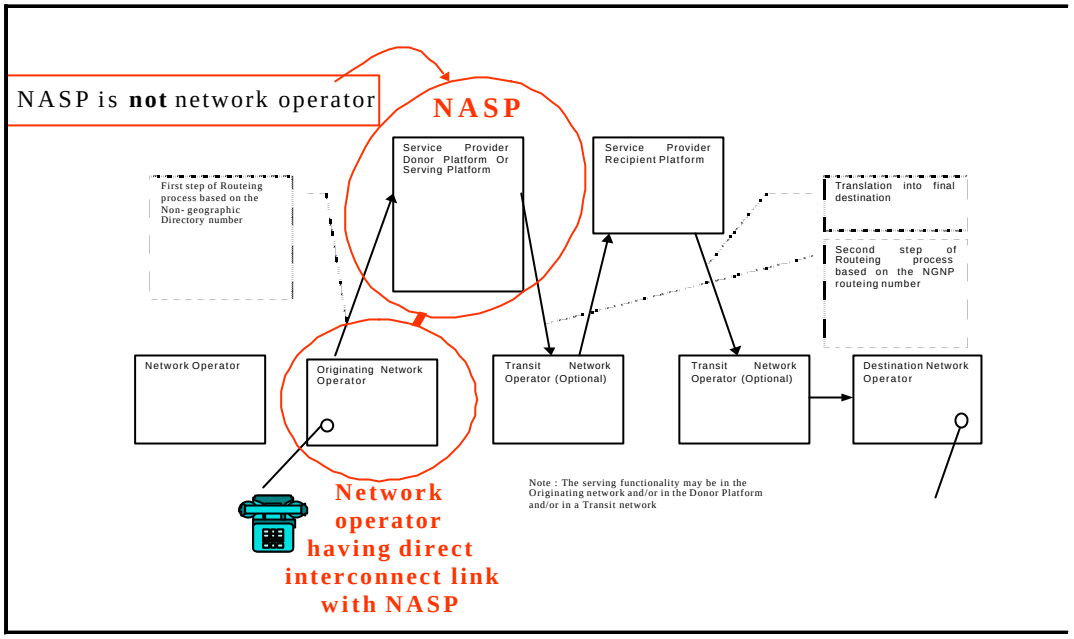

Figure 4 : Off-net call, with the NASP not being a network operator, and the originating network having a direct interconnect link with the NASP.

Case 2.2 : originating network has no direct interconnect link with the NASP

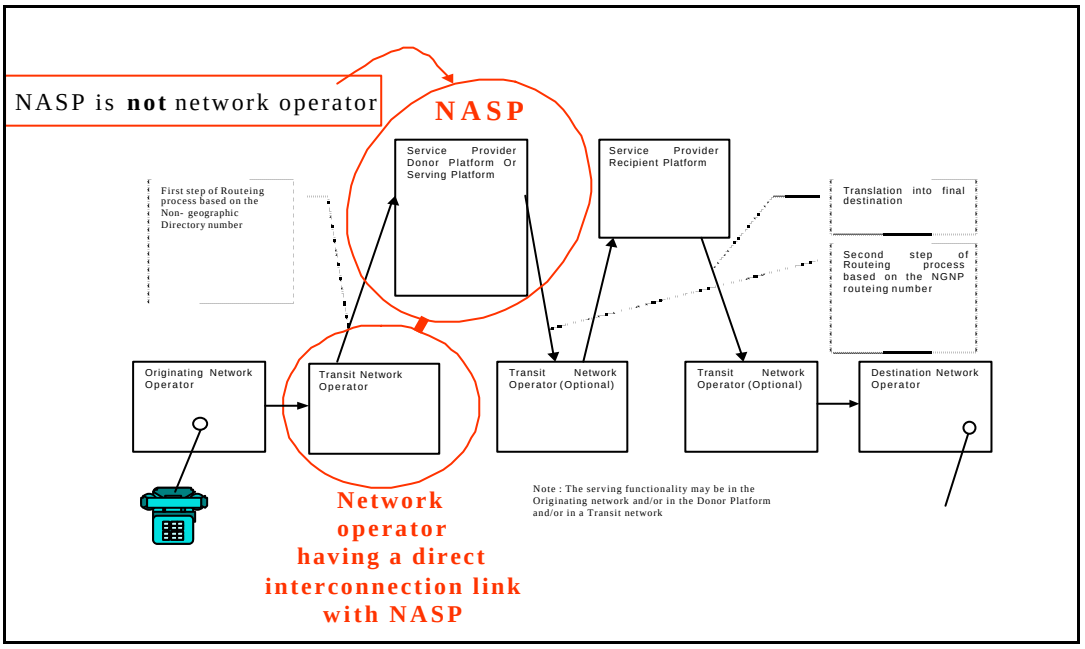

Figure 5 : Off-net call, with NASP not being a network operator, and the originating network not having a direct interconnect link with the NASP

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

Graphically:

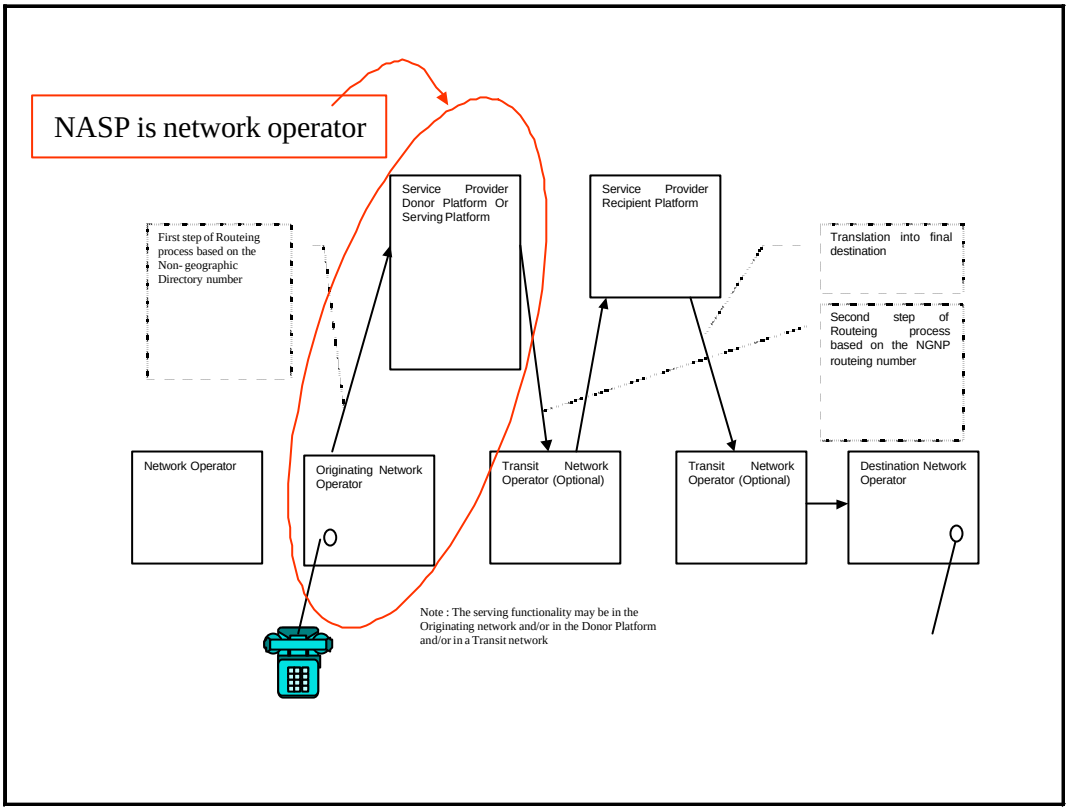

Figure 6 : On-net call, with the NASP being a network operator

4.1.2. Functionalities.

PT1 has defined the activities, functionalities and functions performed by the different network operators and service providers involved in non-geographic 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[4]. We illustrate this hereafter by some generic cases of Non-geographic NP call handling process (not necessarily exhaustive).

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

  The general philosophy in non-geographic number portability discussions is not to impose any technical solution to any network operator/service provider taking part in non-geographic number portability procedures. This means that, depending on the technology chosen by the network operator/service providers involved in the call handling process, the following scenarios can happen (non exhaustive list, based on Figure 2):

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

  ◊ In that case, the *originating network* operator will perform the serving functionality :
  - *the Call Trap Functionality;*
  - *the Database Query Functionality;*

[4] Later in the document, it will show that this functionality (and the cost corresponding with it) is not applicable for non-geographic number portability.

- the Routeing Information Addition Functionality;
- the Range Analysis Functionality.

◊ It has been identified that there are no additional conveyance costs.

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

◊ In that case, a *third party network operator/service provider* will act as serving network/platform 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/service provider can also possibly be implicated in the call handling process as a transit network, if the originating network chooses to use the serving network/platform as such. In this case, the serving network operator/service provider incurs an average porting conveyance cost. We propose to name this transit functionality performed by the serving network operator/service provider, the ***Number portability transit functionality.*** Study proves that this only happens when Onward Routing is continued up to the Donor service provider platform.

◊ 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 perform the serving functionality (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.

◊ It has been identified that there are no additional conveyance costs.

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

1. Scenario one : Originating network is serving network

1.1. Situation one : recipient Service provider is network operator.

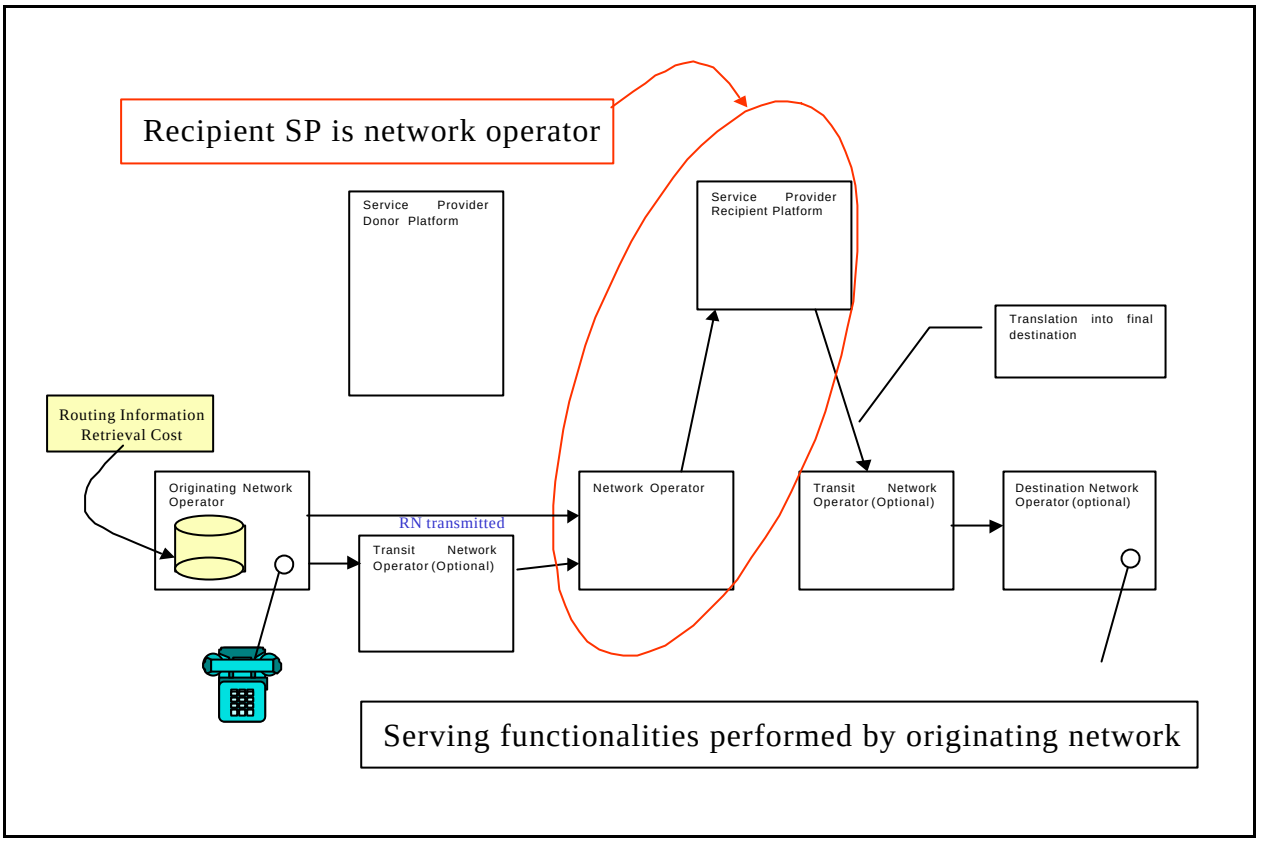

Figure 7: Originating network performs serving functionality, Recipient Service Provider is network operator

Originating network will incur routing information retrieval costs. Recipient Service Provider does not incur any additional cost compared to a call towards a non-geographic number allocated to him.

*1.2. Situation two : recipient Service Provider is **not** network operator. Originating network has a direct interconnect link with recipient Service Provider.*

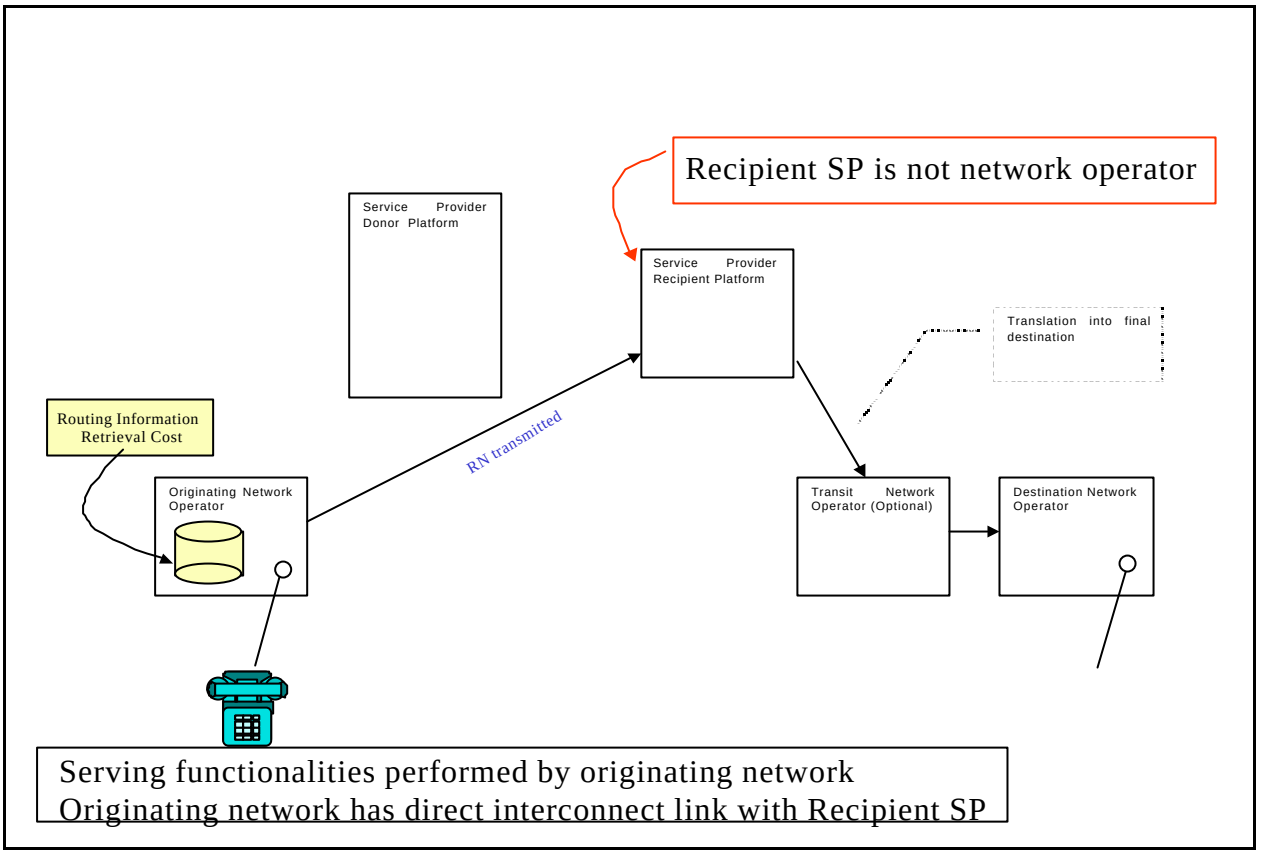

Figure 8 : Originating network performs serving functionality, recipient service provider is not a network operator, originating network has direct interconnection link with recipient service provider

Originating network will incur routing information retrieval costs. Recipient Service Provider does not incur any additional cost compared to a call towards a non-geographic number allocated to him.

*1.3. Situation three : recipient Service Provider is **not** network operator. Originating network has **no** direct interconnect link with recipient Service Provider.*

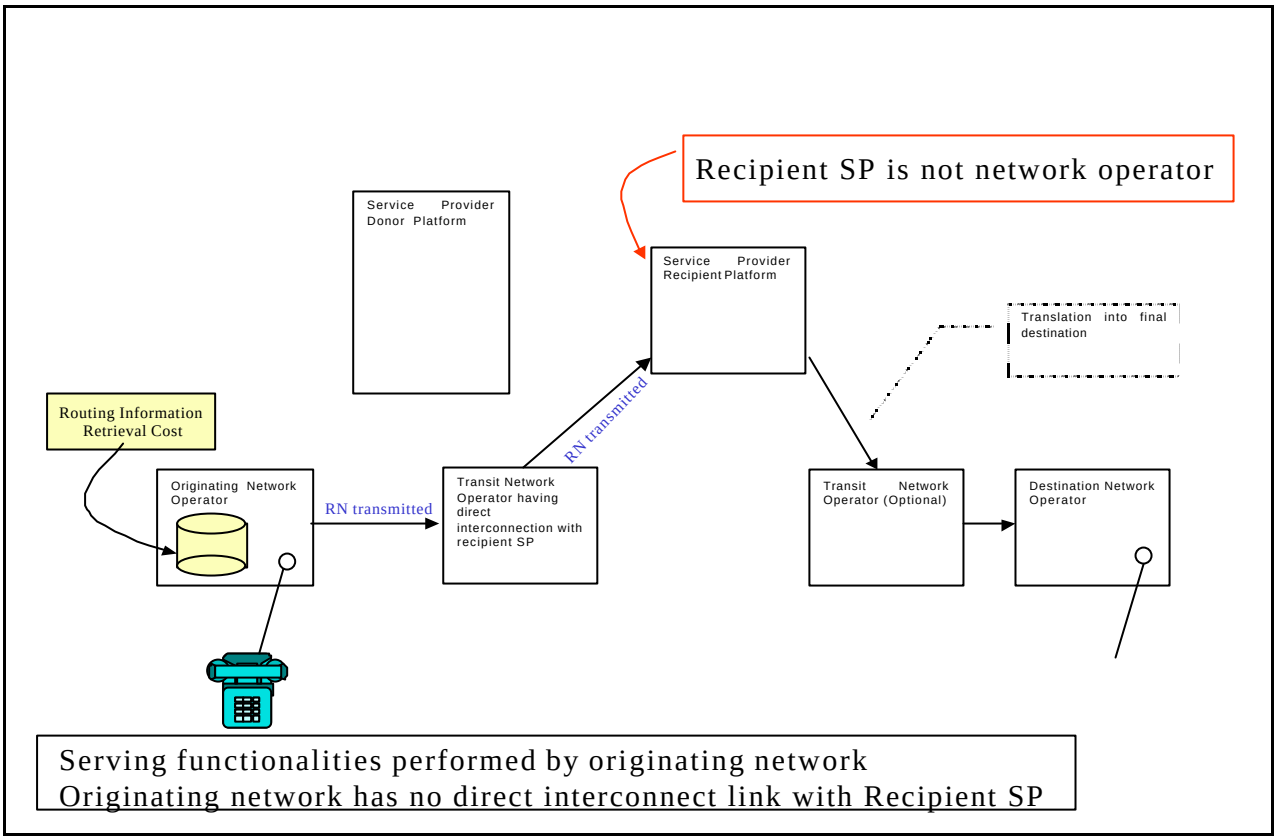

Figure 9 : Recipient Service Provider is not **network operator. Originating network has** no **direct interconnect link with recipient Service Provider**

Originating network will incur routing information retrieval costs. Recipient Service Provider does not incur any additional cost compared to a call towards a non-geographic number allocated to him.

Note : the originating network having no direct interconnect link with the recipient service provider platform, he will communicate (unless RN is not transmitted through the interface) the routing information (C00XX) through the interface to the transit network who will then convey the call accordingly. We propose to name the transit performed by the transit network in this case a « RN transit » : it is not shown in the figure, as it is not a Number Portability traffic related cost. Indeed, this transit cost would also have to be paid by the originating network to the transit network for a call from the originating network towards a non ported non-geo number allocated to the recipient service provider.

2. Scenario two : Transit network is serving network

2.1. Situation one : recipient Service provider is network operator.

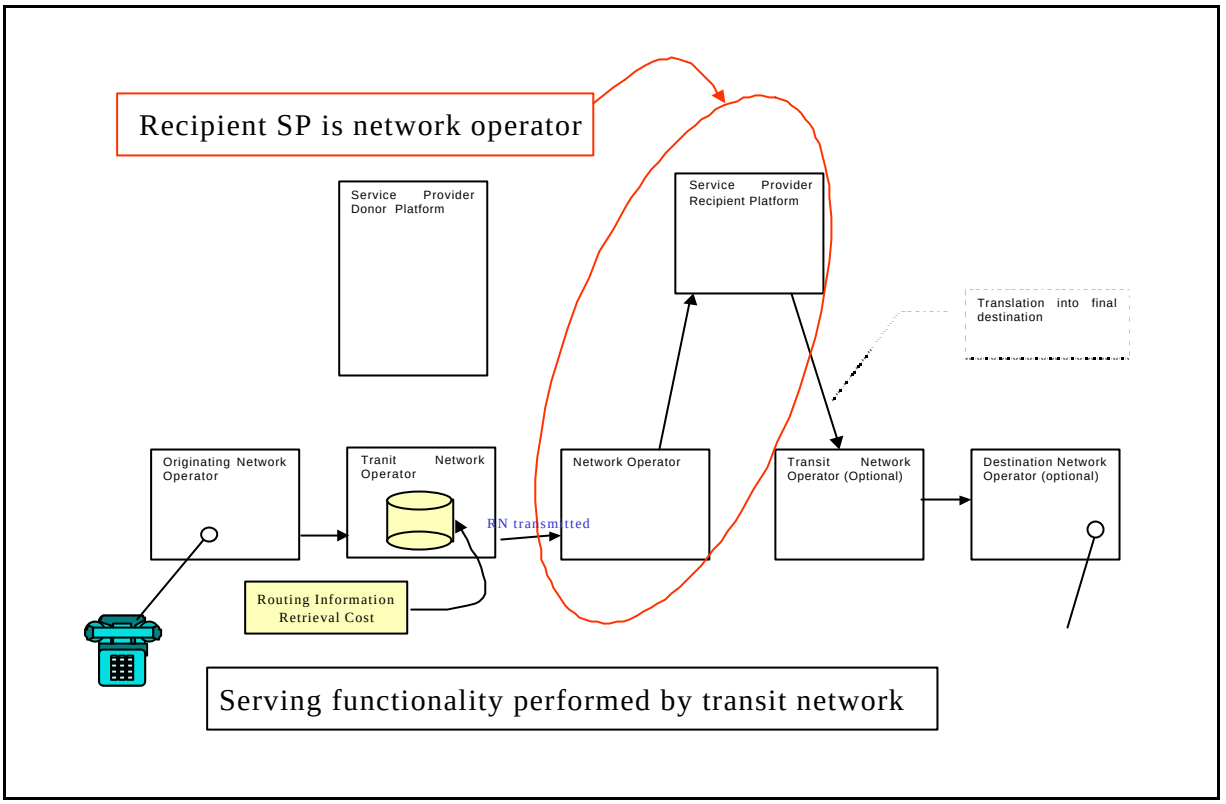

Figure 10 : Transit network performs the serving functionality. Recipient service provider is network operator.

Transit network incurs routing information retrieval costs. Transit network does not incur average porting conveyance costs ; indeed, transit network is remunerated from originating network for the transit activity performed, under the framework of « classical » interconnect transit. Recipient Service Provider does not incur any additional cost compared to a call towards a non-geographic number allocated to him.

*2.2. Situation two : recipient Service provider is **not** network operator. Transit network has a direct interconnect link with recipient Service Provider.*

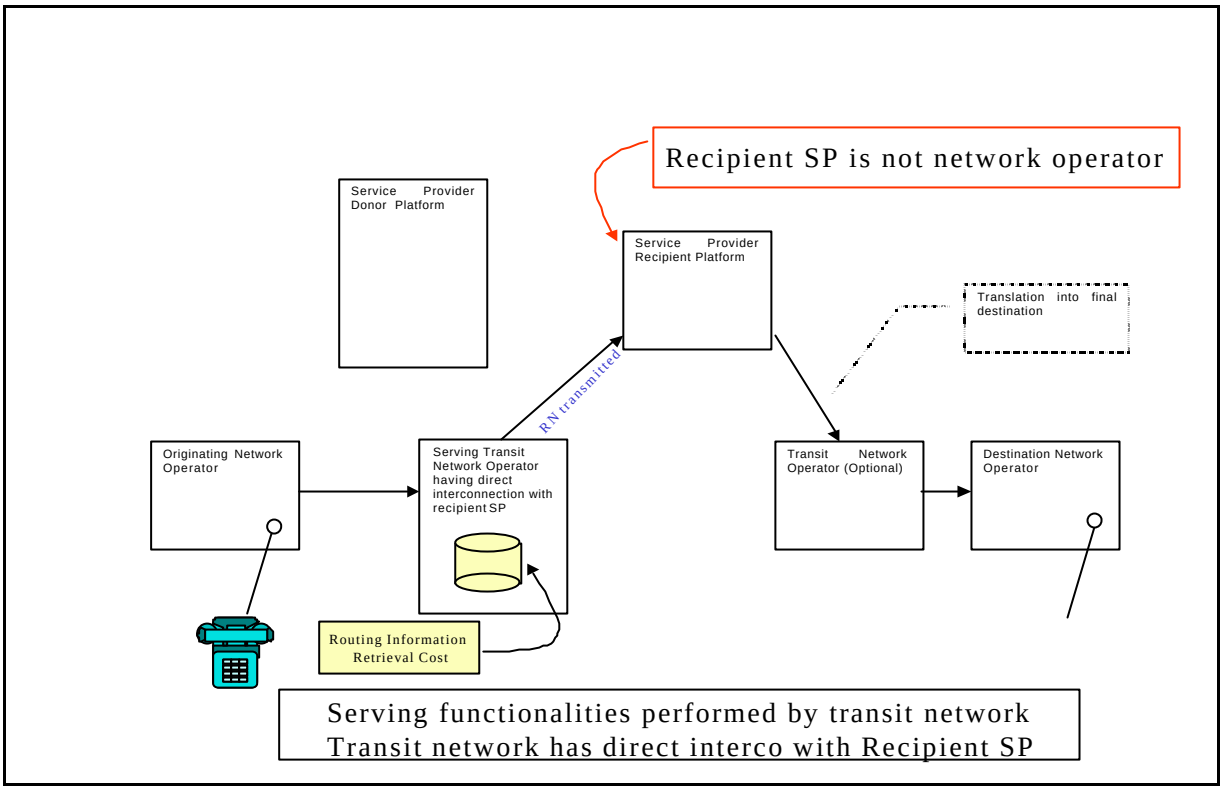

Figure 11 : Transit network performs serving functionality. Recipient Service provider is not **network operator. Transit network has a direct interconnect link with recipient Service Provider**

Transit network incurs routing information retrieval costs. Transit network does not incur average porting conveyance costs ; indeed, transit network is remunerated from originating network for the activity performed, under the framework of « classical » interconnect transit. Recipient Service Provider does not incur any additional cost compared to a call towards a non-geographic number allocated to him.

2.3. Situation three : recipient Service provider is ***not*** *network operator. Transit network has* ***no*** *direct interconnect link with recipient Service Provider.*

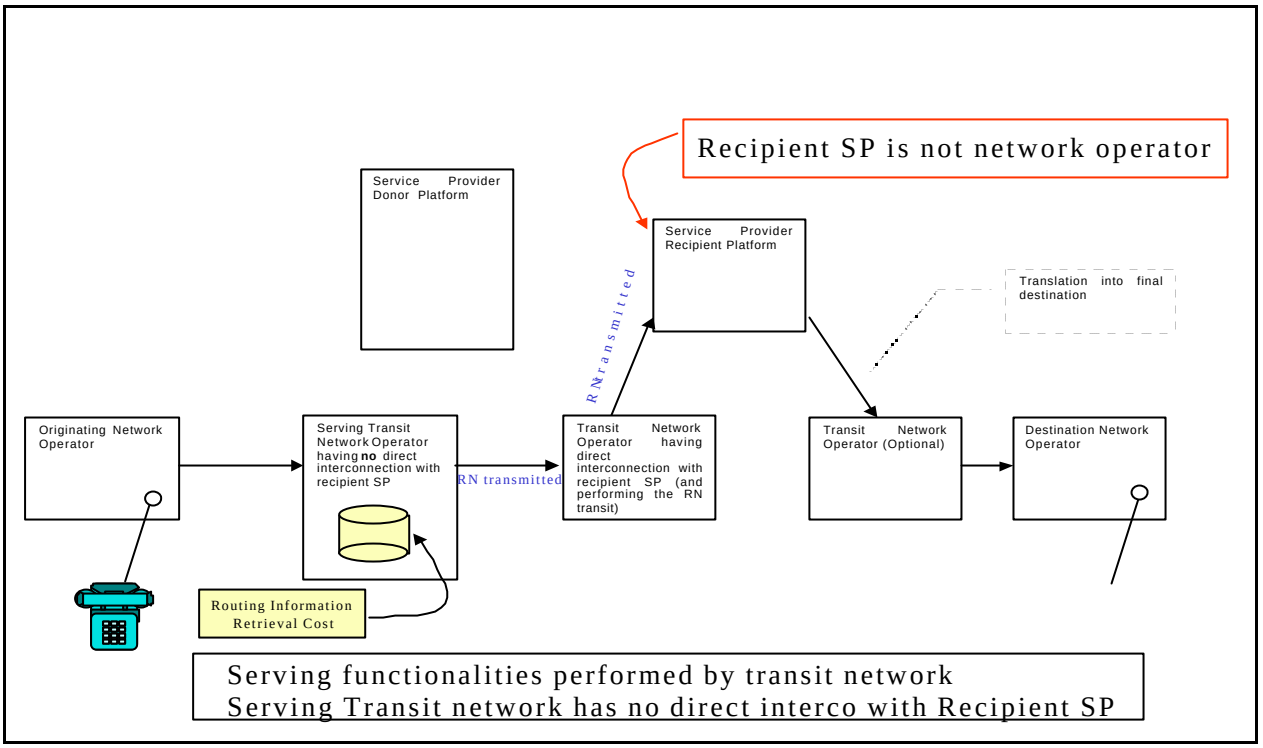

Figure 12 : Recipient Service provider is not **network operator. Transit network has** no **direct interconnect link with recipient Service Provider**

Serving transit network incurs routing information retrieval costs. Serving transit network does not incur average porting conveyance costs ; indeed, serving transit network is remunerated from originating network for the activity performed, under the framework of « classical » interconnect transit.

Note : the serving transit network having no direct interconnect link with the recipient service provider platform, he will communicate (unless RN is not transmitted through the interface) the routing information (C00XX) through the interface to a transit network who will then convey the call accordingly. We propose to name the transit performed by the second transit network a « RN transit » : it is not shown in the figure, as it is not a Number Portability traffic related cost. Indeed, this transit cost would also have to be paid by the serving transit network for a call towards a non ported non-geo number allocated to the recipient service provider. Recipient Service Provider does not incur any additional cost compared to a call towards a non-geographic number allocated to him.

3. Scenario three : onward routing to the donor service provider. Serving functionalities performed by donor service provider.

3.1. Situation one : donor Service provider is network operator.

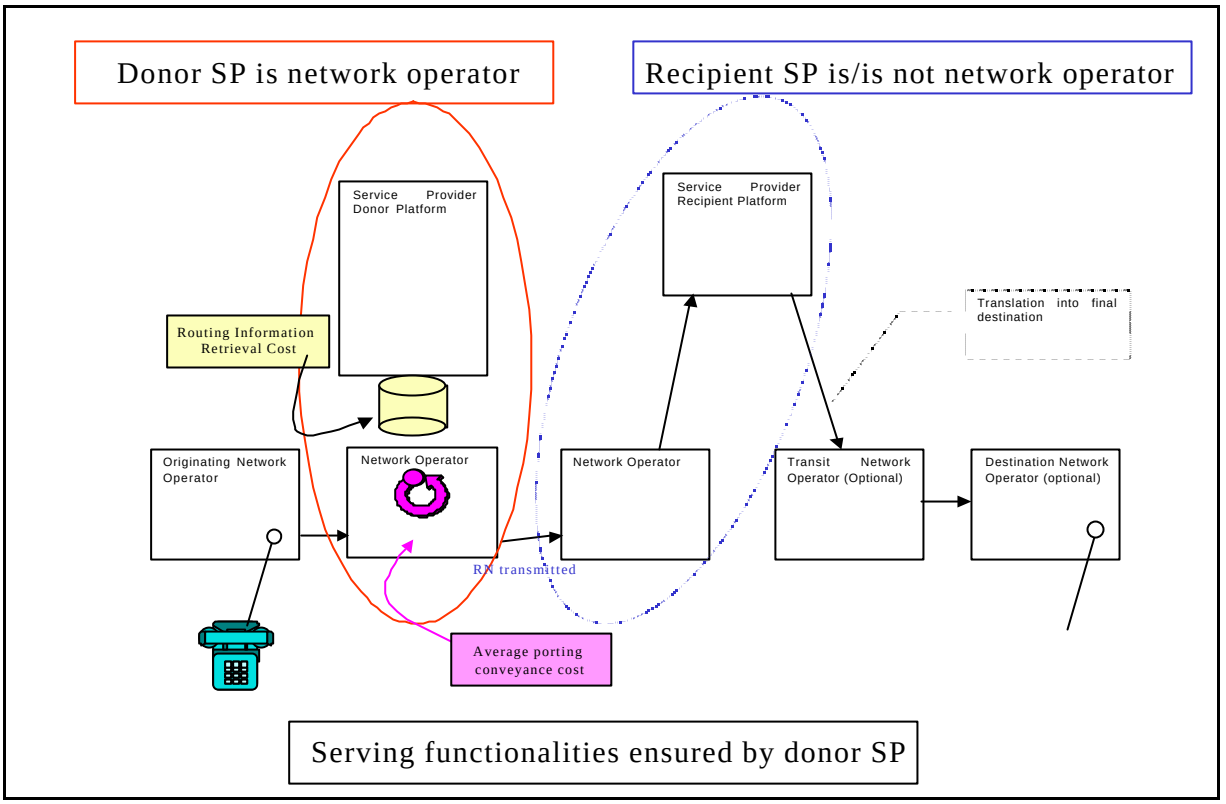

Figure 13 : donor Service provider is network operator

Donor service provider incurs routing information retrieval costs. Donor service provider incurs average porting conveyance costs, as originating network still routes the call towards the donor service provider according to the directory number while only paying a terminating charge to this donor service provider. Recipient Service Provider does not incur any additional cost compared to a call towards a non-geographic number allocated to him.

*3.2. Situation two : donor Service provider is **not** network operator. Originating network has a direct interconnect link with donor Service Provider.*

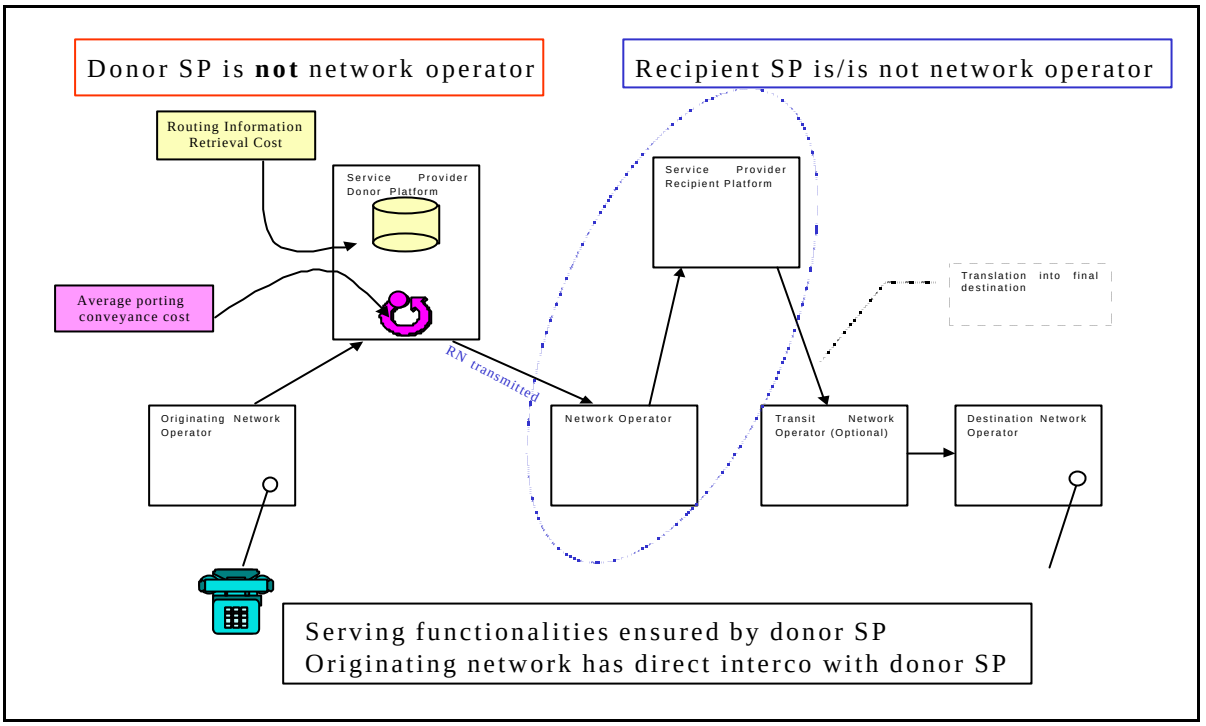

Figure 14 : donor Service provider is not **network operator. Originating network has a direct interconnect link with donor Service Provider**

Donor service provider incurs routing information retrieval costs. Donor service provider incurs average porting conveyance costs, as originating network still routes the call towards the donor service provider according to the directory number, while only paying a terminating charge to the donor service provider. Recipient Service Provider does not incur any additional cost compared to a call towards a non-geographic number allocated to him.

3.3. Situation three : donor Service provider is ***not*** *network operator. Originating network has* ***no*** *direct interconnect link with donor Service Provider.*

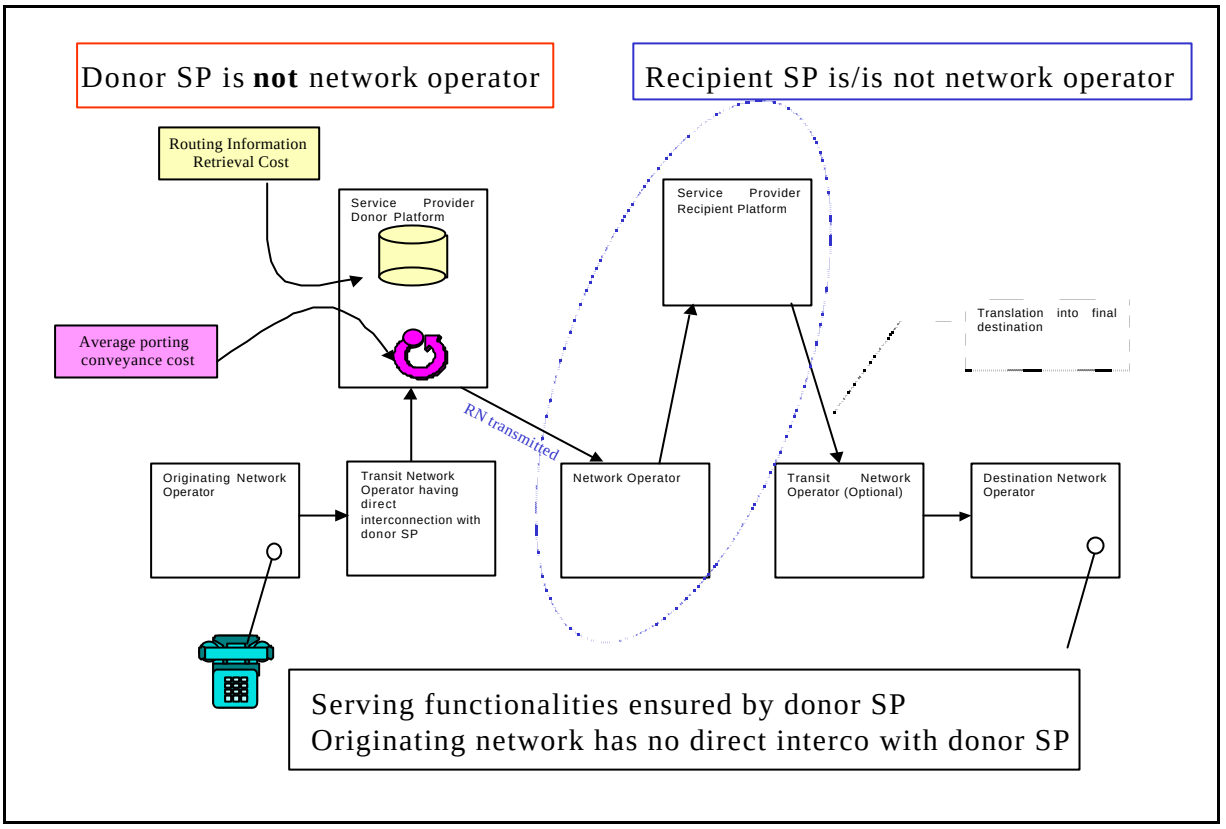

Figure 15 : donor Service provider is not **network operator. Originating network has** no **direct interconnect link with donor Service Provider**

Donor service provider incurs routing information retrieval costs. Donor service provider incurs average porting conveyance costs, as transit network still routes the call towards the donor service provider according to the directory number while only paying a terminating charge to the donor service provider. Transit network does not incur average porting conveyance costs ; it is remunerated by the originating network for the transit activity performed under the framework of « classical » interconnect transit. Recipient Service Provider does not incur any additional cost compared to a call towards a non-geographic number allocated to him.

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

Normally, the one step translation will be performed. Would this not be the case, then the following paragraphs can be considered.[5]

5.1. "N" network operator/service provider and "N-1" network operator/ service provider do not agree on the format of the information for incoming calls made towards ported-in numbers

When the serving network/platform (or more generally the “N-1” network/platform) does not communicate the “C” 00XX + DN (00XX corresponding in fact to the information collected by means of the serving functionality performed by this network/platform) to the recipient service provider platform (more generally the subsequent platform, or “N” platform), whereas recipient service provider network (“N”) has required the format “C” 00XX +

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

DN, this may have a major impact on the costs incurred by the recipient (or subsequent "N") service provider platform since:

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

1.2) recipient network/platform ("N") may be obliged to perform these functions not only for calls to ported numbers but for all incoming calls from the considered "N-1" network/platform;

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. Proposed conclusion

This leads to the conclusion that in case where a "N-1" network operator/service provider should decide to only pass the DN information through the interface, whereas "N" network operator/service provider has required "C" 00XX +DN, "N-1" network operator/service provider should pay back the "N" network operator/service provider for the supplementary costs incurred by "N" network operator/service provider as a result of this choice, namely: the costs of the queries performed by "N" network operator/service provider for all incoming calls on "N" network/platform stemming from "N-1" network/platform.

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

6. Explosive traffic

To be defined.