NPM4v1F
29 January 2002

Mobile Number Portability Task Force:

PT4: Economic aspects

1. Scope

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

The scope of PT4 is to build a general framework containing the economical considerations related to Mobile Number Portability. These economic considerations can be:

- General;
- Related to the economic evaluation of other PT's deliverables;
- 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 mobile 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 mobile number portability, but to try to come up with a consensus on the economic considerations related to the work topics hereafter enumerated.

2. Reference

The documents referred to in this point are used as support to write the document.
They are not to be considered as The reference as such.

Final Version NPNG4v1F – Number Portability Task Force: NP-PT4: Economical Aspects.
M-PT1 draft delivery document
M-PT2 draft delivery document
M-PT3 draft delivery document

3. Cost definitions

3.0. Preliminary

Note: Some cost elements defined hereafter are not exclusively used for NP.

3.1. System set-up costs

3.1.1. Own set-up costs

System set-up costs means the one-off costs incurred by an operator associated with the roll-out or extension of a mobile number portability solution, or with the migration from one to another mobile number portability solution.
These costs are related to all activities needed to establish the technical,

operational and administrative capability to provide portability. Such activities include development, implementation and initial testing. The costs are related to the mobile number portability specific parts of these activities. Such activities are, for instance:

- Network modifications and extensions (hardware and software);
  - Switch adaptations
    - Developments costs
    - Roll-out costs
  - IN platform
  - Signalling network adaptations
  - Data adaptations and configuration
- Efforts spent on inter-working 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 costs topics
  - Related to the project management for the MNP

3.1.2. Database costs

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

3.2. Per number set-up costs

The definitions mentioned are applicable for subsequent orders of porting of a mobile number, as well as for first order porting of a mobile number.
By “first order of porting”, we mean a request of porting made on a mobile number to be ported-out from a Number Range Holder Network
By “subsequent order of porting”, we mean a request of porting made on a mobile number which has formerly been ported-out from a MNO, and which is either ported back to this MNO, or ported-out to another MNO.

The transaction costs relate to:
1) On the technical side:
   the activities in the network needed to treat the porting request of such number.
2) On the operational and administrative side:
   The operational and the administrative activities needed to treat the porting request of such number.

Transaction costs can be incurred by:
1) Owner Network: MNO from which a number is ported out.
2) Recipient Network: MNO to which a number is ported in.

3.3. Per number recurring costs

These are the recurrent costs specifically related to the fact that the number has been ported and the maintenance costs related to the reference database.

3.4. Additional NP costs

3.4.1. NPDB Query cost

NPDB Query cost is the cost incurred by the Originating network or the Transit network, in case of Query On Release or All Call Query, or by the Number Range Holder network, in case of Call Dropback or Onward Routing, to retrieve the routing information on the NPDB.[1]

3.4.2. NP HLR query cost

NP HLR query cost is the cost incurred by the Number Range Holder network, in case of Query on Release, to perform a query on its HLR.

3.4.3. Extra-conveyance cost for the Number Range Holder network

Extra-conveyance cost for the Number Range Holder network is the cost incurred, in case of Query On Release or Call Dropback, to send a release or facility message to the Originating network (including routing information in case of Call Dropback).

3.4.4. Extra-conveyance cost for the Originating network

Extra-conveyance cost for the Originating network is the cost incurred by the Originating network or the Transit network, in case of Query On Release or Call Dropback, to first route the call to the Number Range Holder network, and to receive and treat a release or facility message.

[1] Instead of performing a NPDB query for every call, every operator could choose to perform first a query on its HLR and only to consult its NPDB afterwards in case the number is ported.

3.4.5. Onward Routing transit cost

Onward Routing transit cost is the cost incurred by the Number Range Holder network, as a result of Onward Routing conveyance chosen by the Originating network, to send the IAM to the Subscription Network.

3.4.6. SMS signalling cost

An SMS signalling cost is incurred by the Interrogating network or by the Number Range Holder network to send a SRI for_SM message to the Subscription network.

An SMS signalling cost will also be incurred by the Subscription network to return a SRI_for_SM back message to the Interrogating network.

3.4.7. SMS over-signalling cost

SMS over-signalling cost is the cost incurred by the Interrogating network to send a Forward_SM message to the Subscription network, using the MSC address.

3.5. Other non NP–specific costs

3.5.1. Originating cost

Originating cost is the cost that would have been incurred by the Originating network to route the call to the Number Range Holder network if the number had not been ported (Number Range Holder network = Terminating network).

In case of All call Query, Query On Release or Call Dropback solution, the Originating cost is defined as the cost incurred by the Originating network to route the call to the Terminating network.

In case of Onward Routing, the Originating cost is defined as the cost incurred by the Originating network to route the call to the Number Range Holder network.

3.5.2. Terminating cost

Terminating cost is the cost incurred by the Terminating network to terminate the call received from Originating network, Number Range Holder network or Transit network.

3.5.3. Transit cost

Transit cost is the cost incurred by any Transit network to send the IAM received from the Originating network (or from a preceding Transit network)

to the Subscription Network (or to a following Transit network).

4. Cost identification principles: Voice

4.1. Onward Routing

4.1.1. General description

With the Onward Routing principle, the call to a potentially ported MSISDN is routed to the Number Range Holder network. The Number Range Holder network has access to the NP-DB to retrieve the routing information, corresponding to the called MSISDN. If the MSISDN is ported, an IAM will be sent to the subscription network (I2). If the MSISDN is not ported (i.e. Number Range Holder network = Subscription network) , the call will be treated internally within the network.

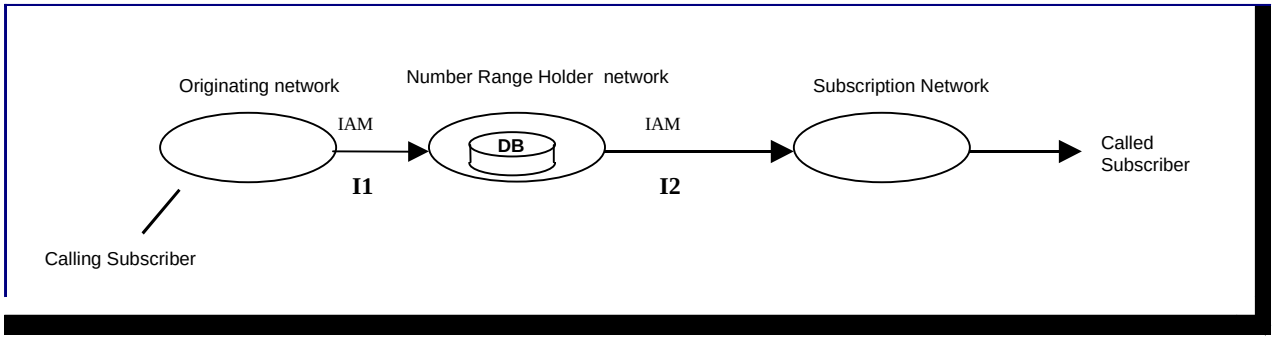


Fig 4.1.1 – "Onward Routing" by Number Range Holder network.

Every Number Range Holder network shall support as a minimum Onward Routing for own number range ported out numbers.

Note that between the Originating network and the Number Range Holder network, other Transit networks can be involved.

4.1.2. Cost identification

The following costs have been identified:
- Originating network: Originating cost;
- Number Range Holder network: NPDB Query cost, Onward Routing Transit cost;
- Subscription network: Terminating cost.

4.2. Call Dropback

4.2.1. Call Dropback without Transit network

4.2.1.1. General description

With the Call Dropback mechanism, the call to a potentially ported MSISDN is first routed to the Number Range Holder network, without performing a NP-DB query (I2).
If the MSISDN is ported out from the Number Range Holder network, a Release message (release cause #23), or Facility message, with special indication that the MSISDN has been ported, will be sent back to the originating network (I2). Re-routing information is enclosed in this release message (retrieved after NP-DB query).

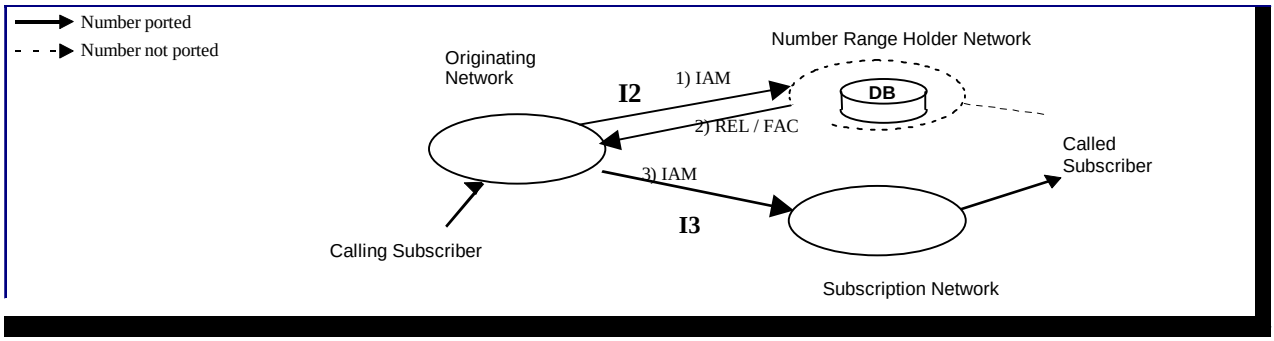


Fig 4.2.1 – "Re-routing on Call Dropback" by Number Range Holder network

4.2.1.2. Cost identification

The following costs have been identified:
- Originating network: Originating cost, Extra-conveyance cost for Originating Network;
- Number Range Holder network: NPDB Query cost, Extra-conveyance cost for Number Range Holder Network;
- Subscription network: Terminating cost.

4.2.2. Call Dropback with Transit network

4.2.2.1. General description

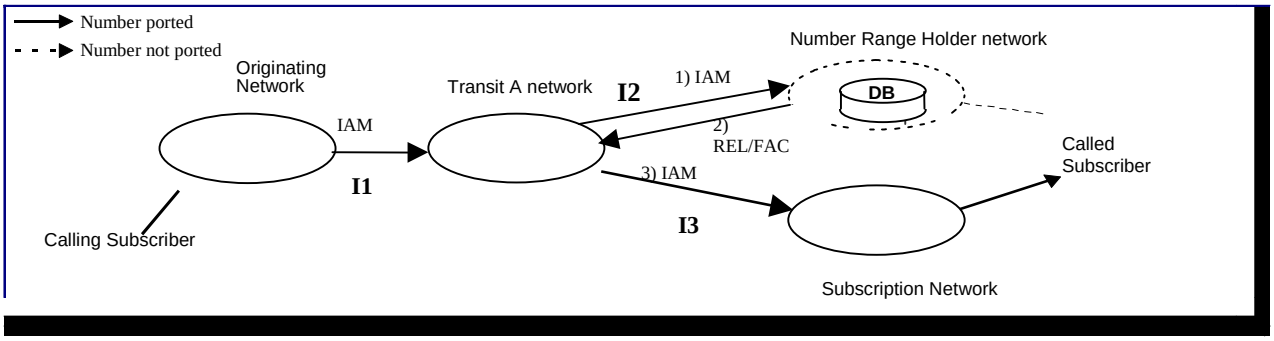


Fig 4.2.3 – "Re-routing on Call Dropback" by Transit network

Based on the retrieved re-routing information, the previous network will route the call to the Subscription network.

Note that between the Originating network and the Transit A network and between the Transit A network and the Number Range Holder network, other Transit networks can be involved. The Release/Facility message, generated by the Number Range Holder network, will be sent backwards, until the first network using the Call Dropback mechanism, is reached.

4.2.2.2. Cost identification

The following costs have been identified:
- Originating network: Originating cost,
- Transit Network : Transit cost, Extra-conveyance cost for Originating Network;
- Number Range Holder network: NPDB Query cost, Extra-conveyance cost for Number Range Holder Network;
- Subscription network: Terminating cost.

4.3. Query on Release

4.3.1. Query On Release without Transit network

4.3.1.1. General description

With the Query on Release mechanism, the call to a potentially ported MSISDN is first routed to the Number Range Holder network, without performing a database query (I2). If the MSISDN is ported out from the Number Range Holder network, a Release message with release cause #14 will be sent back to the Originating network (I2). On receipt of this special release, the Originating network will perform a database query. Based on the retrieved routing information, the call will be routed to the Subscription network. If the Subscription network is the same as the Number Range Holder network , the call is treated internally within the Number Range Holder network.

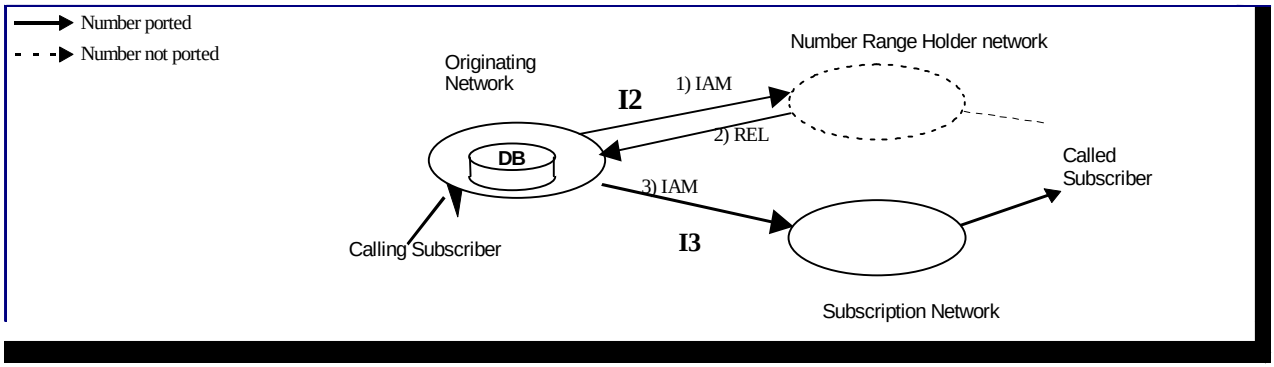


Fig 4.3.1 – "Query on Release" by Originating network

4.3.1.2. Cost identification

The following costs have been identified:

- Originating network: Originating cost, NPDB Query cost, Extra-conveyance cost for Originating Networkt;
- Number Range Holder network: HLR query cost, Extra-conveyance cost for Number Range Holder Network;
- Subscription network: Terminating cost.

4.3.2. Query On Release with Transit network

4.3.2.1. General description

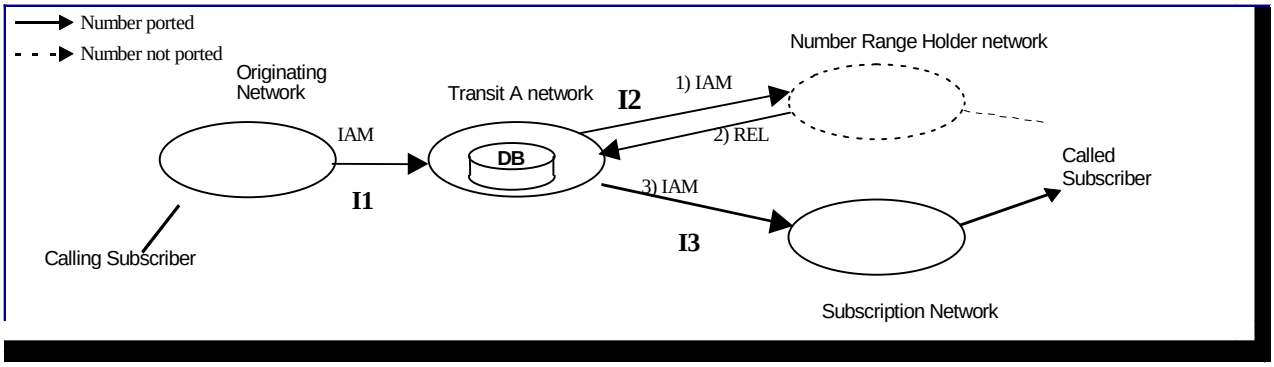


Fig 4.3.3 – "Query on Release" by Transit network

If the MSISDN is ported out from the Number Range Holder network, a Release message with release cause #14 will be sent back to the previous network (I2). On receipt of this special release, this previous network will perform a database query. Based on the retrieved routing information, the call will be routed to the Subscription network. If the Subscription network is the same as the Number Range Holder network , the call is treated internally within the transit network.

Note that between the Originating network and the Transit A network and between the Transit A network and the Number Range Holder, other Transit networks can be involved. The Release message, generated by the Number Range Holder network, will be sent backwards, until a network, using the Query on Release mechanism, is reached.

4.3.2.2. Cost identification

The following costs have been identified:
- Originating network: Originating cost;
- Transit network : Transit cost, Extra-conveyance cost for Originating Network ; NPDB Query cost;
- Number Range Holder network: HLR/ Query cost, Extra-conveyance cost for Number Range Holder Network;
- Subscription network: Terminating cost.

4.4. All Call Query

4.4.1. All Call Query without Transit network

4.4.1.1. General description

This principle requires a NPDB query, prior to routing the call towards the Subscription network.

In the scenario in fig 4.2.1, the Originating network has access to the NP-DB to retrieve the routing information, corresponding to the potentially ported MSISDN. If the MSISDN is ported, the call will be routed to the Subscription network (I3). If the MSISDN is not ported (i.e. Number Range Holder network = Subscription network), the call will be routed towards the Number Range Holder network (I2).

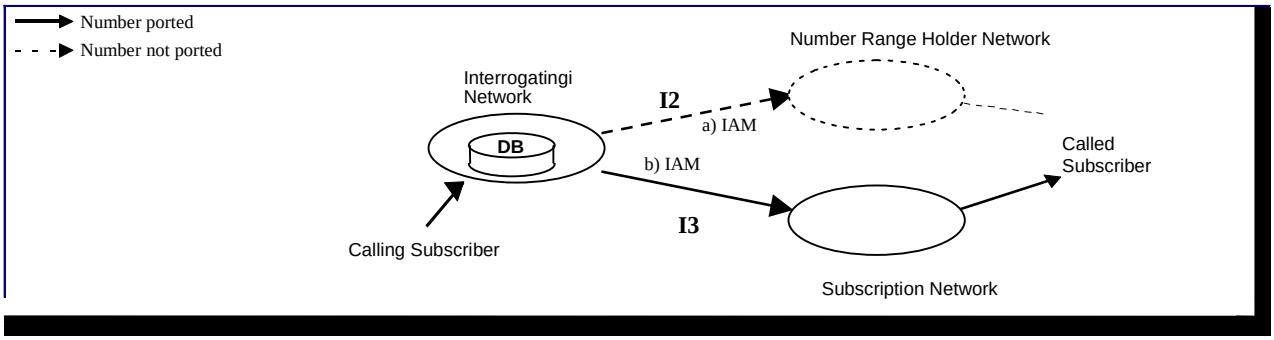


Fig 4.4.1 – "All Call Query" by Originating network

4.4.1.2. Cost identification

The following costs have been identified:
- Interrogating network: Originating cost, NPDB Query cost;
- Number Range Holder network: /
- Subscription network: Terminating cost.

4.4.2. All Call Query with Transit network

4.4.2.1. General Description

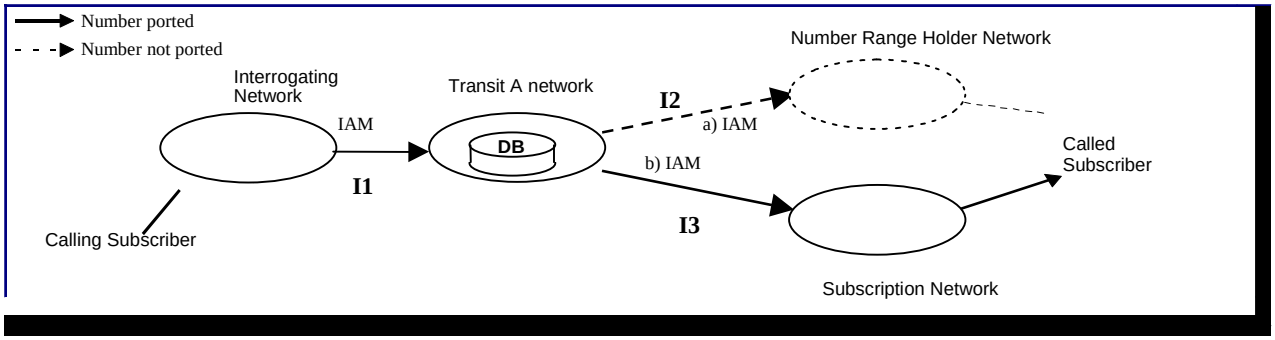


Fig 4.4.3 – "All Call Query" by Transit network

Note that between the Originating network and the Transit A network and between the Transit A network and the Number Range Holder, other Transit networks can be involved.

4.4.2.2. Cost identification

The following costs have been identified:
- Interrogating network: Originating cost;
- Transit network : NPDB Query cost , Transit cost;
- Number Range Holder network: /
- Subscription network: Terminating cost.

5. Cost identification principles: SMS

5.1. Query by Number Range Holder Network

5.1.1. General description

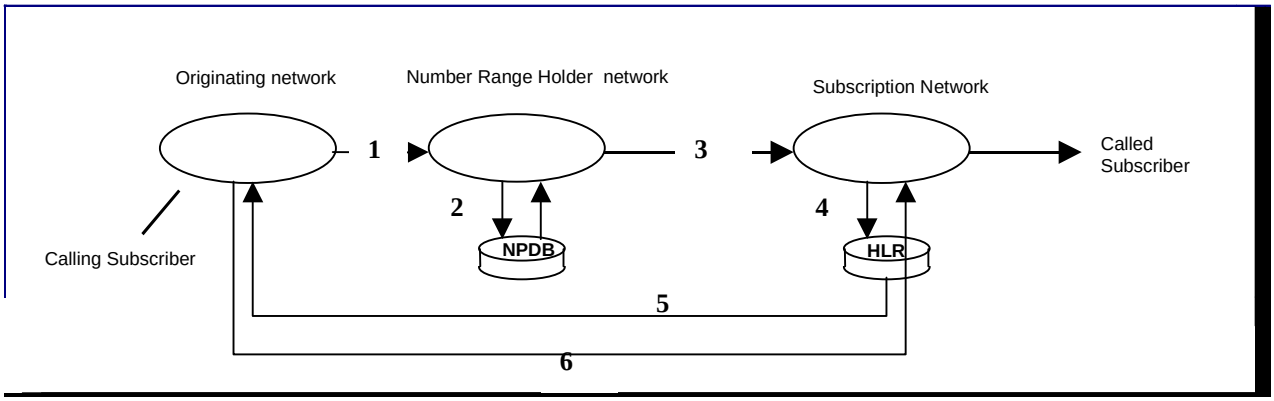
If the originating network does not support the NP-DB query, non-call related signalling will be relayed to the Number Range Holder network (1). When the Number Range Holder-GMSC receives a Forward_SM to a potentially ported MSISDN, it requests information about the location of the called MSISDN by sending a SRI_for_SM message. The MNP-SRF obtains routing information from the NP-DB (2).

If the MSISDN is ported out from the Number Range Holder Network, the MNP-SRF will send a SRI_for_SM message to the Subscription network, containing routing information indicating the Subscription network (3).

If the MSISDN is not known to be ported, the MNP-SRF will send a SRI_for_SM message to the Number Range Holder network, containing the MSISDN number only.

The MNP-SRF within the Subscription Network will interrogate the HLR containing the subscriber data (4). A SRI_for_SM ack message, containing the MSC address will be returned to the Interrogating Network (5).

A Forward_SM message will be sent to the Subscription network, using the MSC address (6).



5.1.2. Cost identification

The following costs have been identified:
- Originating network: SMS Signalling cost, SMS over-signalling cost;
- Number Range Holder network: NPDB Query cost, SMS Signalling cost;
- Subscription network: HLR Query Cost, SMS Signalling cost.

5.2. Query by Originating Network

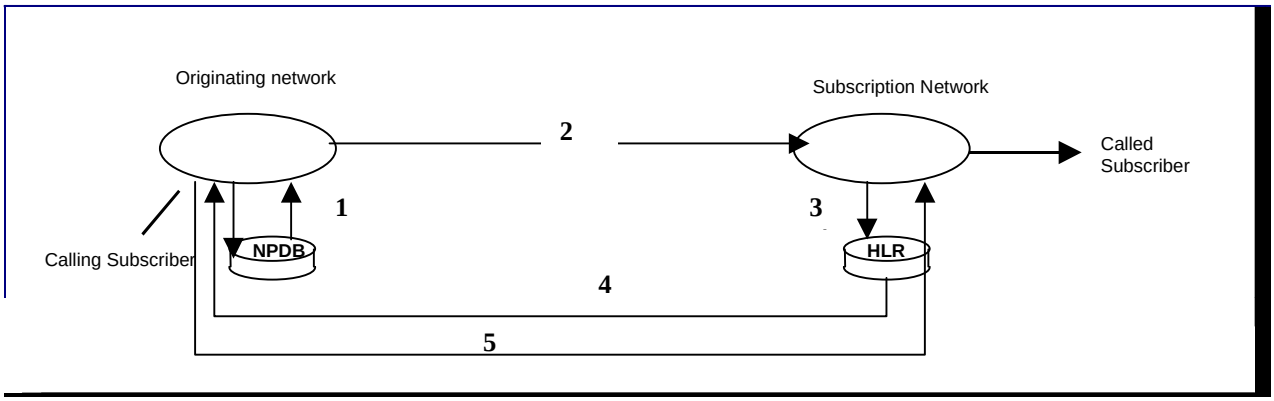
5.2.1. General description

When the Originating network supports the NP-DB query, non call related signalling messages are relayed by an MNP_SRF within the own network. The originating-GMSC receives from its subscriber a Forward_SM to a potentially ported MSISDN, it requests information about the location of the called MSISDN by sending a SRI_for_SM message. The MNP-SRF obtains routing information from the NP-DB (1).

If the MSISDN is ported out from the Number Range Holder Network, the MNP-SRF will send a SRI_for_SM message to the Subscription network, containing routing information indicating the Subscription network (2).

The MNP-SRF within the Subscription Network will interrogate the HLR containing the subscriber data (3). A SRI_for_SM back message, containing the MSC address will be returned to the Interrogating Network (4).

A Forward_SM message will be sent to the Subscription network, using the MSC address (5).



5.2.2. Cost identification

The following costs have been identified:

- Originating network: NPDB Query Cost, SMS Signalling cost, SMS over-signalling cost;
- Subscription network: HLR Query Cost, SMS Signalling cost.