

ANNEX I
TECHNICAL INTERFACE

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1 Introduction

This document aims to present the network's technical specification, including minimum requirements to be satisfied by fixed and mobile operators/providers in the interfaces between respective networks, in order to guarantee the function of Operator Portability between:

1. providers in the fixed telephone network and the integrated services digital network, for geographic and non-geographic numbers;
2. providers in the mobile telephone network, for land mobile service numbers and non-geographic numbers.

The aspects to be covered are those related to the call routing and network signalling method (ISUP) that will make it possible to *trigger* consultation of the database of ported numbers (IN). The process to be supported in the network interface between operators is *Query on Release*. This method is based on consultation of the IN database of the operator when during the release of a call (REL) a message with cause value is received indicating that the number was ported (#14).

The base for this specification is ITU-T's recommendation Q.769.1. Other ETSI and ITU-T international recommendations were also used.

This document also aims to draw up scenarios and descriptions of the tests to be held between providers/operators, in order to verify the fulfilment of the interface between Operator Portability Networks.

2 References

In this specification, the following references were considered:

2.1 ETSI

- [1] EN 302 097 – “Enhancements for support of Number Portability”
- [2] TR 101 119 – “High level description of Number Portability”
- [3] TR 101 118 – “High level network architecture and solutions to support Number Portability”
- [4] TR 101 122 – “Numbering and addressing for Number Portability”
- [5] EG 201 367 – “IN and intelligence support for Service Provider Number Portability”

2.2 ITU-T

- [6] Q.769.1 – “Enhancements for the support of Number Portability”
- [7] Q.764 – “ISDN User Part Signalling Procedures”
- [8] Q.763 – “ISDN User Part Formats and Codes”
- [9] Q.730 – “ISDN User Part Supplementary Services”

3 Abbreviations

ACM	- Address Complete Message
AcQ	All call Query
PDB	- Provider's Database
CCBS	- Completion of calls to busy subscriber
CCNR	- Completion of calls on no reply
CD	- Call Deflection
CFB	- Call Forwarding on Busy
CFNR	- Call Forwarding on No Reply
CFU	- Call Forwarding Unconditional
CLI	- Calling Line Identification
DN	- Directory Number
ETSI	- European Telecommunications Standard Institute
FPH	- Freephone
IAM	- Initial Address Message
ICP	- Instituto das Comunicações de Portugal
IN	- Intelligent Network
ISDN	- Integrated Services Digital Network
ISUP	- ISDN User Part
ITU-T	- International Telecommunication Union – Telecommunications Sector
NRN	- Network Routing Number
PN	- Personal Number
OP-SIN	- Operator Portability – Specification of Interface between Networks
QoR	- Query on Release
REL	- Release Message
UAN	- Universal Access Number
UPT	- Universal Personal Telecommunications
VPN	- Virtual Private Network

4.1.5 Situation of IN translation services

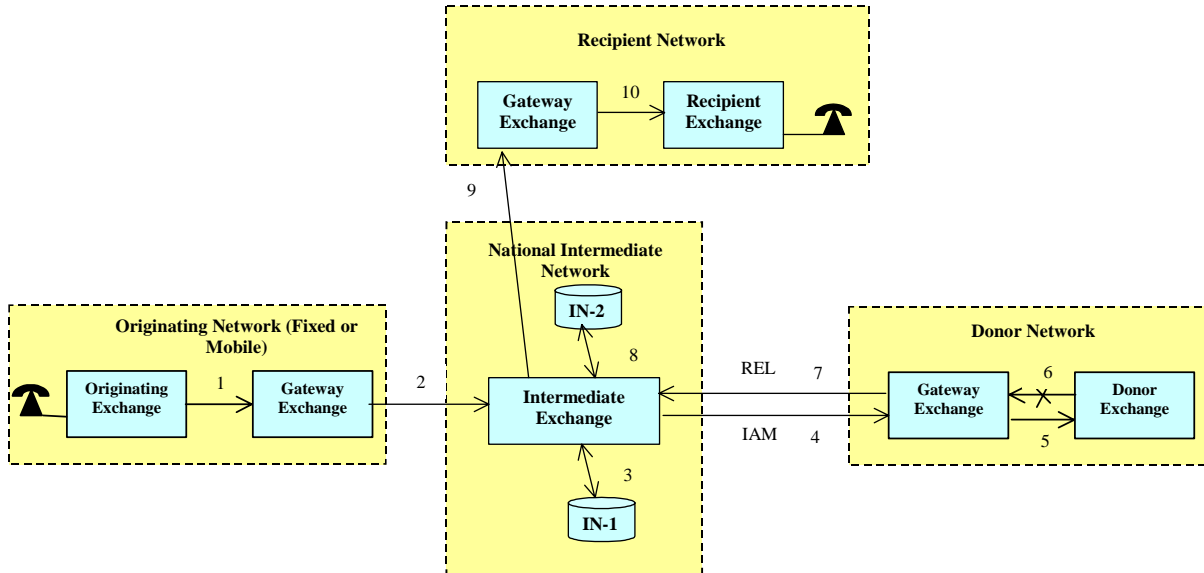


Fig. 5 – Scenario of call originated nationally and rerouted via an intermediate network using an IN translation service (IN-1), such as alteration of “physical” Freephone number etc.

4.1.6 Situation of Rerouting (CFU, CFB, CFNR, CD, etc.)

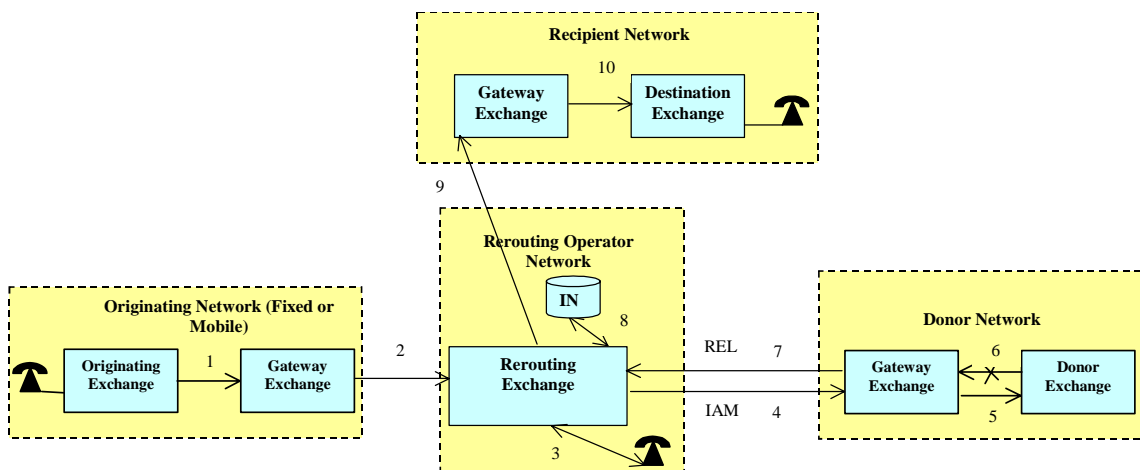


Fig. 6 – Scenario of call originated nationally with rerouting

4.2 Call originated internationally

4.2.1 Situation without any national traffic

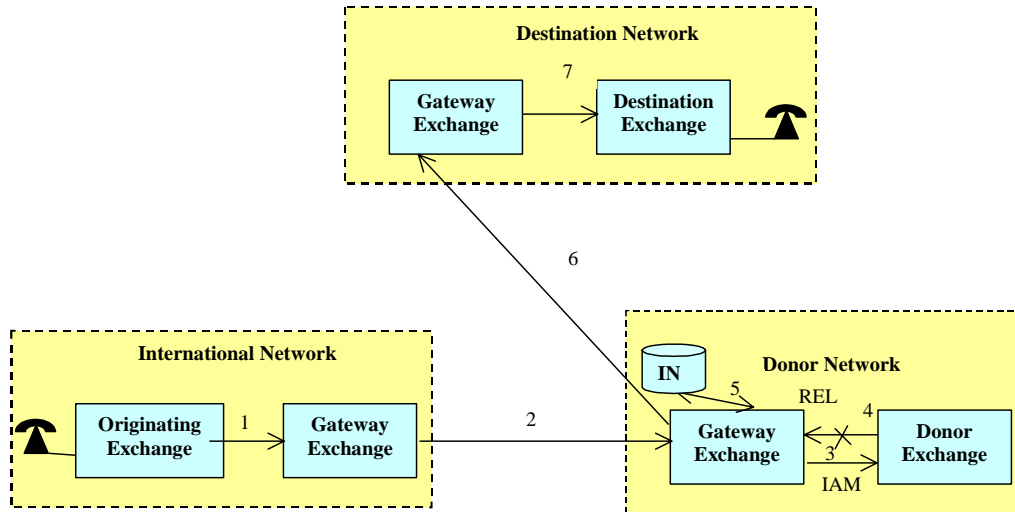


Fig. 7 – Scenario of call originated internationally without transit

4.2.2 Situation with transit with National Operator

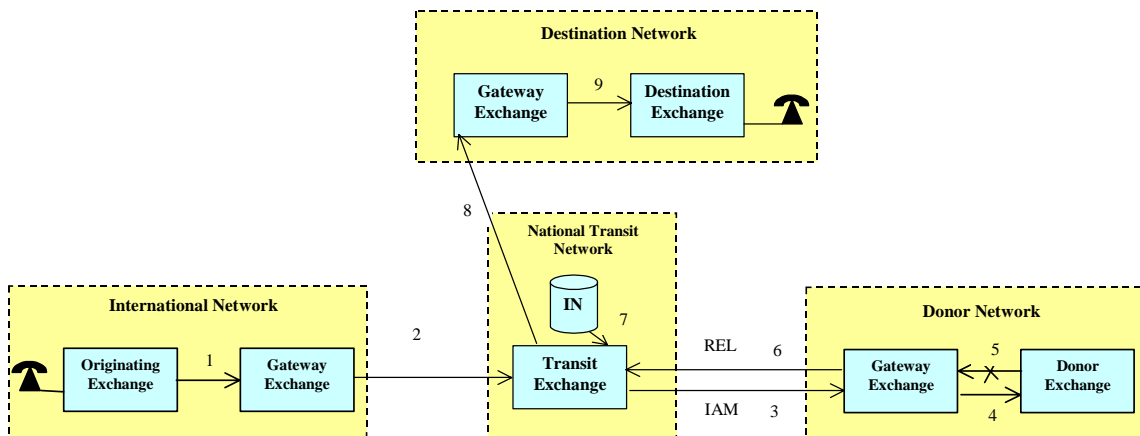


Fig. 8 – Scenario of call originated internationally with national transit

5 Structure of the NRN

The network routing number for ported numbers consists of three distinct fields:

- Service code (D);
- Operator code ($P_1P_2P_3$) assigned by ICP, observing the format 0xy ($x \neq 0$);
- Operator exchange code ($C_1C_2C_3$) defined by the respective operator.

The structure has the following format:

Service	Operator			Exchange			Ported Number					
D	P ₁	P ₂	P ₃	C ₁	C ₂	C ₃	D ₁	D ₂	...	D ₉	...	D ₁₂

Fig. 8 – Format of the NRN + DN

The DN may be of variable length between 9 and 12 digits.

A complete table with the NRNs defined by the various operators will be provided.

6 Applicability of ETSI and ITU-T norms and recommendations

**Table 1 – Exceptions and Clarifications to Norm EN 302 097 of ETSI
“Enhancements for support of Number Portability”**

Item	Title	Comments
	Forward	Applies.
	Endorsement notice	Applies.
	Clause 1 “Scope”	Applies (<i>Dropback</i> method does not apply).
	Clause 2 “References”	Applies (assuming that the implementation resulting from this specification may be supported in networks that do not support all functions of ETSI ISUP V4 – EN 300 356-1 and EN 300 356-2).
	Annex D “Procedures to support Dropback”	Applies (<i>Dropback</i> method does not apply).
	Clause “Bibliography”	Applies.

**Table 2 – Exceptions and Clarifications to Rec. Q.769.1 of the ITU-T
“Enhancements for support of Number Portability”**

Item	Title	Comments
1	Scope	<p>The support method of number portability considered in this specification is <i>Query on Release</i> (QoR).</p> <p>To simplify aspects of inter-functioning and routing, the addressing method considered is the “concatenated” addressing method, described in Annex A.</p> <p>Annexes B, D and E apply.</p>
2	References	Applies (assuming that the implementation resulting from this specification may be supported in networks that do not support all functions of the latest versions of ISUP).
3	Definitions	Applies.

**Table 2 – Exceptions and Clarifications to Rec. Q.769.1 of the ITU-T
“Enhancements for support of Number Portability”**

Item	Title	Comments
4	Abbreviations	Applies. CCBS - Completion of calls to busy subscriber CCNR - Completion of calls on no reply CD - Call Deflection CFB - Call Forwarding Busy CFNR - Call Forwarding No Reply CFU - Call Forwarding Unconditional FPH - Freephone IN - Intelligent Network PN - Personal Number UAN - Universal Access Number UPT - Universal Personal Telecommunications VPN - Virtual Private Network
5	Conventions	Applies.
6	Call control and signalling procedures	The method chosen is <i>Query on Release</i> , and therefore the methods - <i>All Call Query</i> and <i>Onward Routing</i> – do not apply. The addressing method considered is the “concatenated” addressing method.
6.1	Separate Directory Number Addressing method	Does not apply.
6.2	Other addressing methods	The addressing method adopted is that in Annex A (<i>Concatenated Addressing method</i>).
6.3	Actions required in the originating network	Does not apply.
6.4	Actions required in the donor network	Does not apply.
6.5	Actions required in a transit network	Does not apply.
6.6	Actions required in the recipient network	Does not apply.
ANNEX A	Procedures for the Concatenated Addressing method	-
A.1	General	Applies.
A.2	Exceptions to Clause 6 of this Recommendation	The <i>Called Party Number</i> should be codified as follows: 0000011 – <i>national (significant) number</i> In terms of signalling (<i>Calling, Connected, Redirecting, Redirection number</i> , etc.) the identification of the ported number that should be sent by the recipient exchange is always the respective DN (and should never include the NRN). The only exception, in terms of signalling will be <i>Called Party Number</i> at terminated calls.
ANNEX B	Procedures for the Separate Network Routing Number Addressing method	Does not apply.

**Table 2 – Exceptions and Clarifications to Rec. Q.769.1 of the ITU-T
“Enhancements for support of Number Portability”**

Item	Title	Comments
ANNEX C	Procedures to support Query on Release	-
C.1	General	Applies.
C.2	Procedures for QoR with the forward and the backward indications	Does not apply
C.2.1	Normal procedures	-
C.2.1.1	Originating exchange	Does not apply
C.2.1.2	Intermediate exchange	Does not apply
C.2.1.3	Gateway exchange	Does not apply
C.2.1.4	Donor exchange	Does not apply
C.2.1.5	Exchange receiving a Release message with the QoR cause value	Does not apply
C.2.2	Exceptional procedures	Does not apply
C.3	Procedures for QoR with the backward indication only	Applies.
C.3.1	Normal procedures	-
C.3.1.1	Originating exchange	Applies
C.3.1.2	Intermediate exchange	Applies. In the event that this exchange carries out some type of rerouting (CFU, CFB, CFNR, CD, etc) or sets off the “ <i>trigger</i> ” for some IN service (FPN, PN, UPT, VPN, UAN, etc) on this call, the information relative to the new IAM message generated should be stored, in order to carry out the “ <i>query</i> ” in accordance with the requirement listed in point C.3.1.4.
C.3.1.3	Donor exchange	Applies. Whenever this exchange has already carried out some type of rerouting procedure (CFU, CFB, CFNR, CD, etc) on this call, the <i>Release</i> message (QoR: <i>ported number</i>) will not be generated, and this exchange should initiate the “ <i>query</i> ” procedure (using the number to which the call was rerouted), and forward the call.

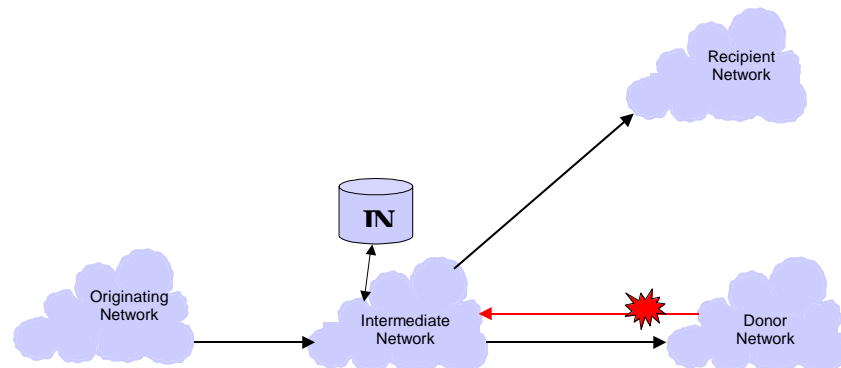
**Table 2 – Exceptions and Clarifications to Rec. Q.769.1 of the ITU-T
“Enhancements for support of Number Portability”**

Item	Title	Comments
C.3.1.4	Exchange receiving a Release message with the QoR cause value	<p>Applies.</p> <p>Whenever this exchange has already carried out some type of rerouting procedure (CFU, CFB, CFNR, CD, etc) or set off the “<i>trigger</i>” for some IN service (FPH, PN, UPT, VPN, UAN, etc.) on this call, the <i>Release</i> message will not be passed back, instead this exchange should initiate the “<i>query</i>” procedure (using the number to which the call was rerouted or the new destination number returned by the IN service, depending on the type of service activated. In the case that both are active, the destination number returned by the last service to be activated will be used) and forward the call.</p>
C.3.2	Exceptional procedures	<p>Applies.</p> <p>Interaction with call rerouting services (CFU, CFB, CFNR, CD, etc) Exchanges that have carried out some type of rerouting should not pass back the “<i>Release</i>” message with cause value #14 (QoR: <i>ported number</i>), initiating the “<i>query</i>” procedure to the database, based on the rerouting destination number.</p> <p>Interaction with CCBS/CCNR services While there is no stabilisation in terms of ETSI/ITU norms a solution for redirecting SCCP messages to the recipient network, the indications of “CCBS possible” and “CCNR possible” must be removed by the exchanges that have carried out QoR on these calls, thus avoiding that these indications are erroneously sent to the originating exchange.</p>
ANNEX D	Procedures to support Dropback	Does not apply
ANNEX E	Procedures for forward transfer of number portability status information	Does not apply.

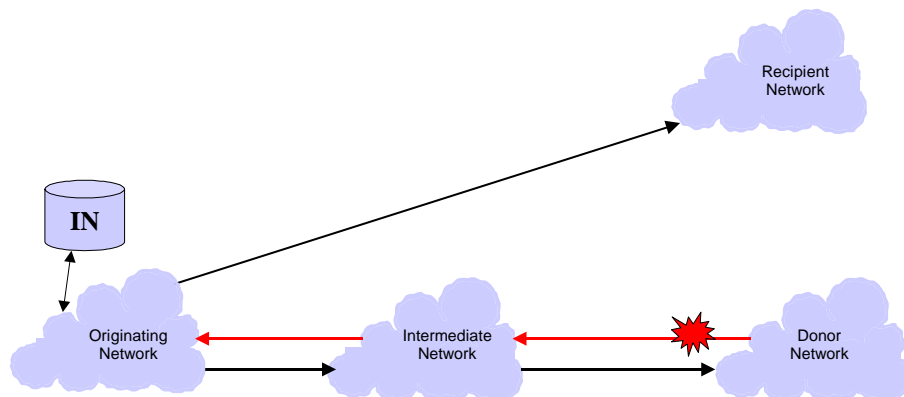
7 Test Scenarios of Operator Portability

In relation to possible test scenarios of Operator Portability the following situations were identified:

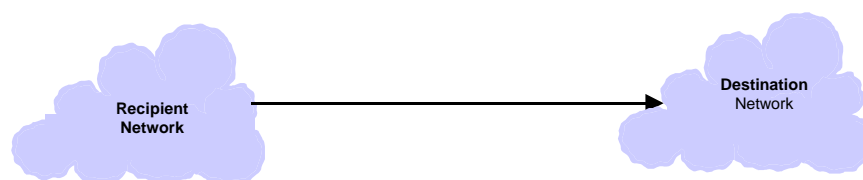
7.1 Configuration 1



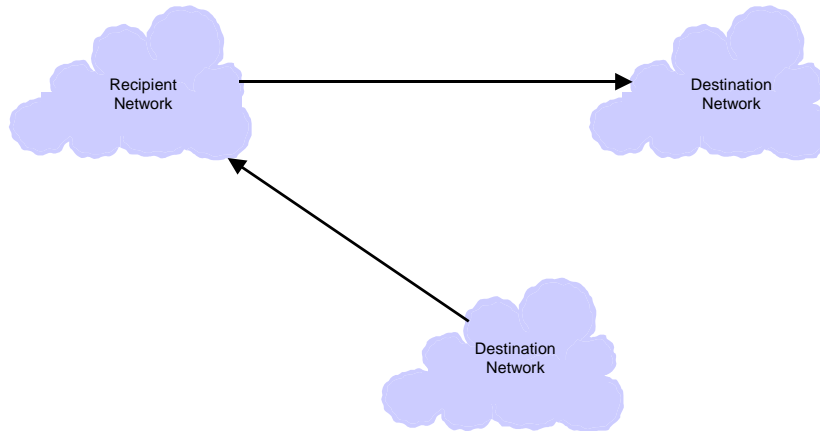
7.2 Configuration 2



7.3 Configuration 3



7.4 Configuration 4



8 List of Tests

1. Verification of the Operator's translation in the case of a ported number – successful situation
 - 1.1. Call originated in a network with the possibility of making a *query* to the PDB
 - 1.2. Call originated in a network without the possibility of making a *query* to the PDB
 - 1.3. Call rerouted to a ported number
 - 1.4. Non-geographic service call with translation to a ported number
2. Verification of the Operator's translation in the case of a ported number – unsuccessful situation
 - 2.1. Unsuccessful translation of ported number
 - 2.2. NRN+DN do not exist in recipient network
3. Verification of identification of ported number in the Recipient Network
 - 3.1. Originated call (verification of the *Calling Party Number*)
 - 3.2. Rerouted call (verification of the *Redirection Number* – ACM and *Redirecting Number* – IAM)

Note: In the event that an Originating Operator or Intermediate Operator opts for the *All call Query* (AcQ) method, the network should accept to release the call when it receives REL #14. It should be noted that this scenario will always occur, even in an AcQ environment, when there are errors in the portability database.

9 Description of Tests

9.1 Verification of the Operator's translation in the case of a ported number – Successful situation

Test Number:	1.1
Configuration Number:	2
Test Title:	Call originated in a network with the possibility to make a <i>query</i> to the PDB
Objective:	To verify that the intermediary network passes the REL message with cause value #14 in a transparent manner.
References:	1. OP-SIN: §3.1.1 and §3.1.2 2. ITU-T Q.769.1: §C.3.1.1, §C.3.1.3 and §C.3.1.4 with ICP's specification comments (OP-SIN)
Test Description:	<ol style="list-style-type: none"> 1. Making a call from a network that has the possibility to make a <i>query</i> to the PDB (e.g. Mobile operator); 2. Verify whether the REL message with cause value #14 is generated in the donor network; 3. Verify whether the intermediary network passes the REL message with cause value #14 in a transparent manner; 4. Verify whether the REL message (#14) in the originating network sets off the IN <i>trigger</i> (<i>query</i> to the PDB) with correct translation of the NRN+DN; 5. Verify whether the call is correctly routed to the recipient network; 6. Verify whether the call is successful.

Test Number:	1.2
Configuration Number:	1
Test Title:	Call originated in a network without the possibility to make a <i>query</i> to the PDB
Objective:	Verify whether a intermediary network when receiving the REL message with cause value #14 makes the <i>query</i> to the PDB and routes the call to the number's recipient network.
References:	1. OP-SIN: §3.1.3, §3.2.1 and §3.2.2 2. ITU-T Q.769.1: §C.3.1.2, §C.3.1.3 and §C.3.1.4 with ICP's specifications comments(OP-SIN)
Test Description:	<ol style="list-style-type: none"> 1. Making a call from a network that does not have the possibility to make a <i>query</i> to the PDB (e.g. International Operator, National Carrier); 2. Verify whether a REL message with cause value #14 is generated in the donor network; 3. Verify whether the REL (#14) in the intermediary network sets off the IN <i>trigger</i> (<i>query</i> to the PDB) with correct translation of the NRN+DN; 4. Verify whether the call is correctly routed to the recipient network; 5. Verify whether the call is successful.

Test Number:	1.3
Configuration Number:	1
Test Title:	Call rerouted to a ported number
Objective:	Verify whether the intermediary network when rerouting to a ported number and receiving the REL message with cause value #14 makes the <i>query</i> to the PDB and routes the call to the number's recipient network.
References:	<ol style="list-style-type: none"> 1. OP-SIN: §3.1.5 2. ITU-T Q.769.1: §C.3.1.2, §C.3.1.3, §C.3.1.4 and §C.3.2 with ICP's specifications comments (OP-SIN)
Test Description:	<ol style="list-style-type: none"> 1. Making the call from any network to a number, rerouted to a ported number; 2. Verify whether the REL message with cause value #14 is generated in the donor network; 3. Verify whether the REL (#14) in the intermediary network sets off the IN trigger (<i>query</i> à PDB) with correct translation of the NRN+DN; 4. Verify whether the call is correctly routed to the recipient network; 5. Verify whether the call is successful.

Test Number:	1.4
Configuration Number:	1
Test Title:	Non-geographic service call with translation to a ported number
Objective:	Verify whether the intermediary network when translating a non-geographic number to a ported number and receiving the REL message with cause value #14 makes the <i>query</i> to the PDB and routes the call to the translated number's recipient network.
References:	<ol style="list-style-type: none"> 1. OP-SIN: §3.1.4 2. ITU-T Q.769.1: §C.3.1.2, §C.3.1.3 and §C.3.1.4 with ICP's specifications comments(OP-SIN)
Test Description:	<ol style="list-style-type: none"> 1. Making the call from any network to a non-geographic number translated to a ported number in the intermediary network; 2. Verify whether the REL message with cause value #14 is generated in the donor network; 3. Verify whether the REL (#14) in the intermediary network sets off the IN trigger (<i>query</i> à PDB) with correct translation of the NRN+DN; 4. Verify whether the call is correctly routed to the recipient network; 5. Verify whether the call is successful.

9.2 Verification of the Operator's translation in the case of a ported number – Unsuccessful situation

Test Number:	2.1
Configuration Number:	1
Test Title:	Unsuccessful translation of a ported number
Objective:	Verify whether the intermediary network when not succeeding in translating a number to ported number due to its non-existence in the PDB passes back the REL message with cause value #31.
References:	1. ITU-T Q.769.1: §C.3.2 with ICP's specifications comments (OP-SIN)
Test Description:	<ol style="list-style-type: none"> 1. Making the call from any network to a ported number; 2. Verify whether the REL message with cause value #14 is generated in the donor network; 3. Verify whether the REL (#14) in the intermediary network sets off the IN trigger (<i>query</i> to the PDB) and fails due to non-existence of NRN+DN relationship; 4. Verify whether the call is disconnected with cause #31; 5. Verify that the call is unsuccessful.

Test Number:	2.2
Configuration Number:	1 and/or 2
Test Title:	Non-existence of NRN+DN in recipient network
Objective:	Verify whether the recipient network when not finding the ported number sends back the REL message with cause value #1.
References:	1. ITU-T Q.769.1: §6.6 with ICP's specifications comments (OP-SIN)
Test Description:	<ol style="list-style-type: none"> 1. Making the call from any network to a ported number; 2. Verify whether the REL message with cause value #14 is generated in the donor network; 3. Verify whether the REL (#14) in the intermediary network sets off the IN trigger (<i>query</i> à PDB) and with correct translation of the NRN+DN; 4. Verify whether the call is routed to the recipient network; 5. Verify whether the call is disconnected with cause #1; 6. Verify whether the call is unsuccessful.

9.3 Verification of the identification of the ported number in the Recipient network

Test Number:	3.1
Configuration Number:	3
Test Title:	Originated call (verification of the <i>Calling Party Number</i>)
Objective:	Verify whether the <i>Calling Party Number</i> (CLI) parameter is sent correctly.
References:	1. ITU-T Q.769.1: §A.2 with ICP's specifications comments (OP-SIN)
Test Description:	<ol style="list-style-type: none"> 1. Making the outgoing call from the recipient network of the recipient interface of the ported number; 2. Verification of the CLI (IAM's <i>Calling Party Number</i> parameter).

Test Number:	3.2
Configuration Number:	4
Test Title:	Rerouted call (verification of the <i>Redirection Number</i> – ACM and <i>Redirecting Number</i> – IAM)
Objective:	Verify whether the <i>Redirecting Number</i> parameter (in the IAM message) and the <i>Redirection Number</i> parameter (in the ACM message) are sent correctly.
References:	1. ITU-T Q.769.1: §A.2 with ICP's specifications comments (OP-SIN)
Test Description:	<ol style="list-style-type: none"> 1. Rerouting (CFU, CFB, CFNR, CD) the recipient interface of the ported number to any number; 2. Making a call to the rerouting number of the recipient network; 3. Verification of the <i>Redirecting Number</i> parameter (in the IAM message); 4. Verification of the <i>Redirection Number</i> parameter (in the ACM message).

Annex

FORMS FOR TESTS BETWEEN OPERATORS NACIONAIS

IDENTIFICATION OF OPERATORS INVOLVED			
Originating Operator	Intermediate Operator	Donor Operator	Recipient Operator

TESTS TO BE CARRIED OUT		OK	NOK
1. Verification of the translation of the Operator in the case of a ported number – successful situation			
1.1	Call originated in a network with the possibility to make a <i>query</i> to the PDB	<input type="checkbox"/>	<input type="checkbox"/>
1.2	Call originated in a network without the possibility to make a <i>query</i> to the PDB	<input type="checkbox"/>	<input type="checkbox"/>
1.3	Call rerouted to a ported number	<input type="checkbox"/>	<input type="checkbox"/>
1.4	Non-geographic service call with translation to a ported number	<input type="checkbox"/>	<input type="checkbox"/>
2. Verification of the Operator's translation in the case of a ported number – Unsuccessful situation			
2.1	Unsuccessful translation of a ported number	<input type="checkbox"/>	<input type="checkbox"/>
2.2	Non-existence of NRN+DN in recipient network	<input type="checkbox"/>	<input type="checkbox"/>
3. Verification of the identification of the ported number in the Recipient network			
3.1	Originated call (verification of the <i>Calling Party Number</i>)	<input type="checkbox"/>	<input type="checkbox"/>
3.2	Rerouted call (verification of the <i>Redirection Number</i> – ACM and <i>Redirecting Number</i> – IAM)	<input type="checkbox"/>	<input type="checkbox"/>

COMMENTS

TEST OFFICIALS			
Originating Operator	Intermediate Operator	Donor Operator	Recipient Operator
SIGNATURES			

