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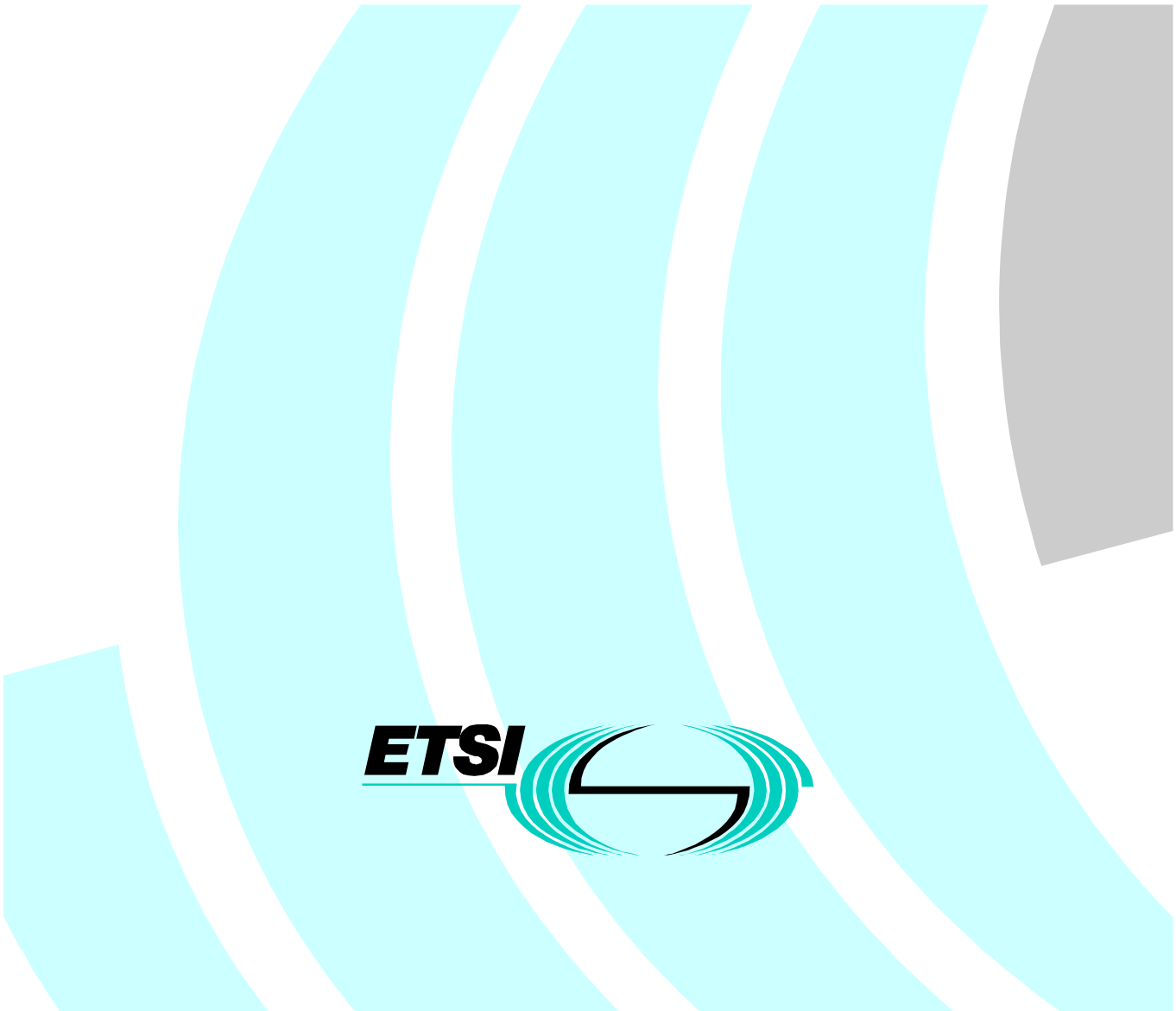
Technical Report

Number Portability Task Force (NPTF); Administrative support of service provider portability for geographic and non-geographic numbers



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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Services and Protocol for Advanced Networks (SPAN).

Introduction

The present document presents an overview of the Processes required to implement, and operate Number Portability between Service Providers. The Processes that are contained herein are limited to the High Level Service Description of Number Portability.

The descriptions of the processes do not deal with processes within operators, within service providers, or between a Service Provider and his operator within the same domain. Service Providers and network operators within the same domain have to agree between them, how they interchange information about future and current porting. But those internal processes must be implemented in such a way that they do not conflict with the process as described here. It is not the intention of this report to detail how information is provided or used in each domain.

Each of the processes are described in clause 4, together with the differences that Number Portability imposes as opposed to normal operation, the information flows, and escalation procedures required.

The intention of this report, in providing such a description of the processes, is to provide a checklist for implementation. Each implementation will have to take account of the national regulatory and commercial environment.

1 Scope

The present document considers the inter-operator/service provider processes required to support Number Portability, in particular, the information transfer requirements. Processes include:

- service establishment (including initial contact, planning, implementation & testing);
- impact upon number administration;
- customer porting (including requests, validation, scheduling, contingency planning, porting);
- subsequent portability, cessation;
- service maintenance (including network changes, introduction of new number ranges);
- fault handling;
- ancillary system processes (which may include billing, directory enquiries, emergency;
- services, numbering plan administration and law enforcement agencies).

The subsequent amendment to a porting order, or postponement to a porting order is outside the scope of the present document.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] TR 101 119 (V1.1): "Network Aspects (NA); High level description of number portability".

[2] ITU-T Recommendation E.164 (1997): "The international public telecommunication numbering plan".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Relinquishing Network: Network from which the number is being ported.

Directory Enquiry Service Provider: Service Provider that provides alternate Directory Services to end customers.

Wholesale Billing: Billing process where the 'customer' is a Service Provider or another Network Operator.

Interconnect Managers: Appropriately qualified and authorized staff within Service Providers and Network Operators with responsibility for matters pertaining to Interconnect.

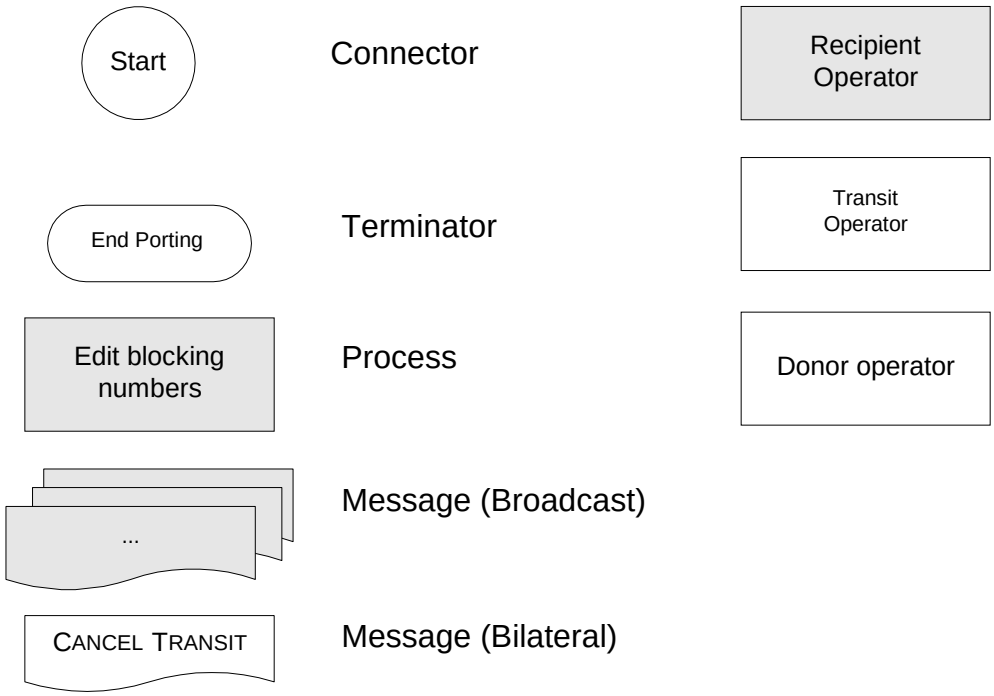


Figure 1

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

DIS	Directory Information Systems
DQ	Directory Enquiry
ESE	Emergency Services Enterprise
ISS	Information Support Systems
LEA	Law Enforcement Agencies
NO	Network Operator
NP	Number Portability
NPA	Numbering Plan Administration
NRA	National Regulatory Authority
OSS	Operational Support Systems
SP	Service Provider

4 Assumptions

Interconnect agreements are in place between involved operators, including agreed points of contact.

There is an agreed timescale against which involved operators will deliver Number Portability.

Each operator is responsible for ensuring that their network, and Information Support Systems, are suitably prepared to handle number portability.

Access to emergency service and, if appropriate, operator services shall be maintained.

No assumption is made as to the architectural solution adopted. However, it is recognized that if a centralized database approach is taken, information flows to serving networks may in practice be via a central entity. Any further discussion is outside the scope of the present document.

Number portability will only be delivered on request of the customer. If a customer transfers to another operator and does not explicitly indicate that he wants to keep his number, the customer will get another number.

The 'one-stop shop model' is applicable to number portability. Point of departure in this model is that the recipient Service Provider, to whom the customer wants to transfer, is in control of the porting from the relinquishing entity to the recipient entity. This is by analogy with the insurance world and, consequently, this model is also called the 'insurance-model'.

A number can only be served by one network operator.

There will be a synchronized process because otherwise the routing of calls can go wrong.

The network operators do not make any changes to the content of the messages that are exchanged between the recipient Service Provider and the relinquishing Service Provider.

Except in the case of broadcast, a message is logically only sent from one participant to another participant; in other words, the network operators do not interpret a message from one Service Provider to another Service Provider.

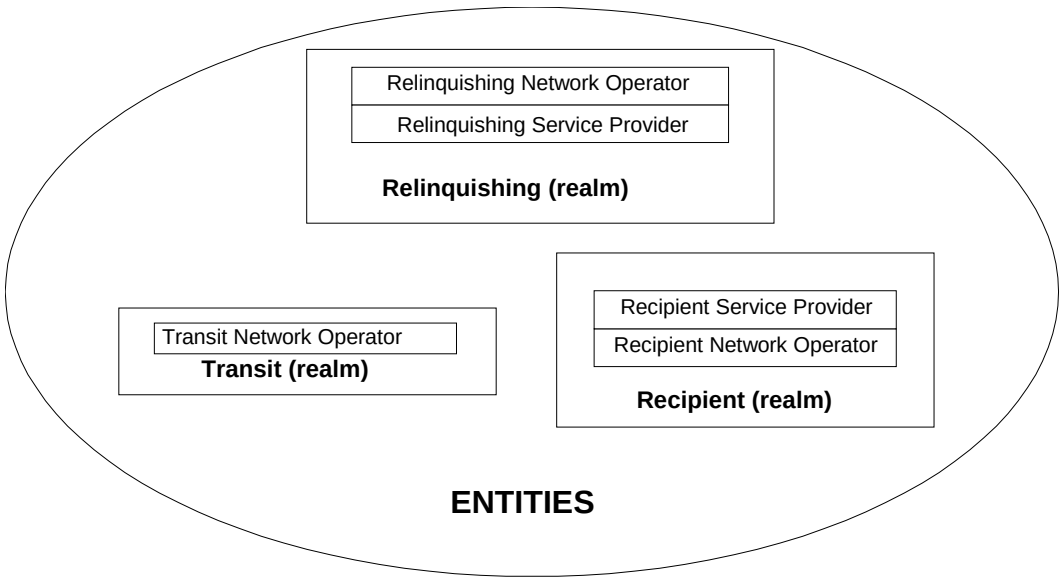
5 Entities involved in the Porting Process

5.1 Distribution Chain for Porting Service

The distribution chain of the porting service contains the following roles:

- customer;
- Service Provider (SP);
- Network Operator (NO).

The assumption is made that generically speaking these roles can always be identified although these roles may not be fulfilled by separate legal entities (in practical situations some of these roles will be combined). For a clear understanding of the process, in the present document these roles will be seen as separate entities. In addition, sometimes the term recipient or relinquishing is used. It means either the service provider, or the network operator, or both, depending on the context. In the figure below, the relation of the various roles and wording is explained. To identify a realm, either realm is used, or combined with relinquishing/recipient, or only relinquishing and/or recipient is used. In some particular cases, the relinquishing entity may also be the donor entity (e.g. if the number is ported for the first time). The term donor will only be used when it is of specific interest that the entity fulfils the donor role. In all other cases the term relinquishing will be used.



NOTE: This diagram may not include all entities involved.

Figure 2: Explanation of the wording used in the present document

The functional relationships between the entities participating in the porting process are indicated in the figure below. In the one-stop shop model, on which the processes are based, the recipient service provider is responsible for managing the whole process. (The physical links and connections used to realize the porting process may be different). Therefore, the communication will be at the level of the service providers.

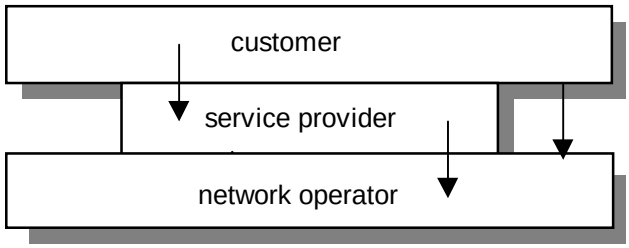


Figure 3: The Functional Relationships for telecommunication services

5.1.1 Service Provider (SP)

Service provider is defined in [1]. Examples of service provider include a service operator/reseller in the case of Service numbers.

5.1.2 Network Operator

Network Operator is defined in [1].

Within the NP process three "different" networks can be identified: relinquishing, recipient, and donor network. Definitions of relinquishing, recipient, and donor network can be found in [1]. The relationships between relinquishing, recipient, and donor network are also visualized in the figure below.

The donor network operator will retain ownership of the numbers allocated to it by the Numbering Plan Administration regardless of how many of those numbers are ported to other operators, i.e. the number portability process does not have any effect on the allocation of numbers.

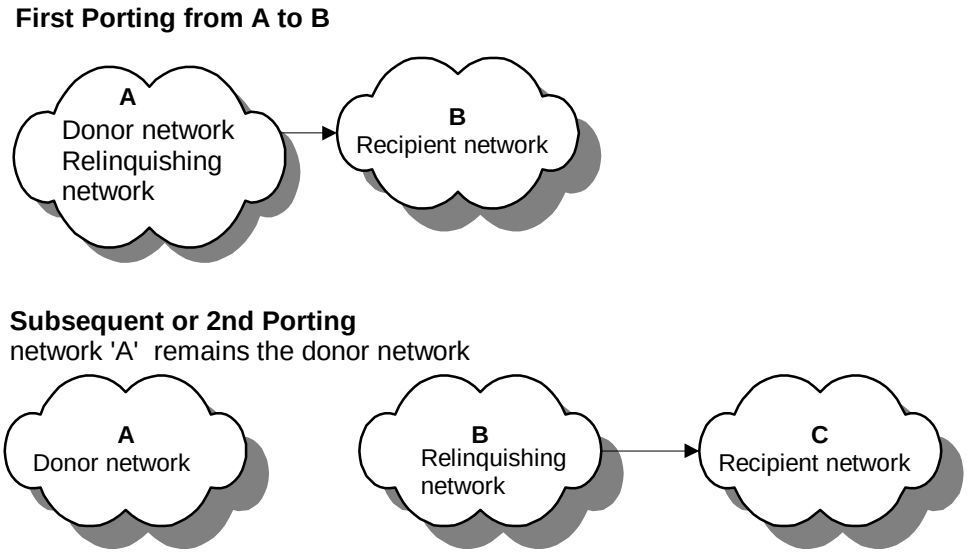


Figure 4: Explanation of relinquishing, recipient and donor network

5.1.3 Transit network

The transit network is defined in [1].

5.2 'One-stop Shop' Model

Number portability means that a customer resigns their subscription with a service provider and contracts another subscription with another service provider without changing their number. With the one-stop shop model, the customer contacts a SP of the recipient network operator. The recipient SP takes care of the porting and is responsible for the whole porting process. Although the SP is responsible for the interface to the end-user, the actual porting and exchange of messages about the porting are done by network operators.

The recipient Service Provider will inform the donor Service Provider to port the customer. After the port the donor will not charge the customer anymore (with the exception of the final bill) and the customer now belongs to the recipient operator.

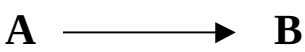
6 Processes

6.1 Convention

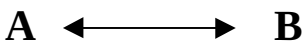
For each process, the present document identifies what it is, why it is required, what are the information flows, and what are the escalation procedures. Note that the involved entities are considered from a functional perspective; for example, in an "Onward Routeing" implementation, the donor Service Provider would act as both "Donor" and "Serving" entities, meaning that for the physical implementation, information flows to both functional entities should be considered. Similarly, for QoR implementations, the Donor provides some of the serving network functionality, meaning that for the physical implementation, information flows to both functional entities would be considered.

The following conventions are used in the Information Flow clauses:

Entity "A" provides information to Entity "B":



Entities "A" and "B" exchange information:



Entities "A", "B" or "C" that exchange information are dependent upon the exact circumstances in which the process is executed.

Although the precise infrastructure to support the number portability process is outside the scope of the document, it is important to remark that some electronic infrastructure is needed. A fax-process won't do because of the large volume of porting requests. Therefore this clause indicates that an infrastructure is needed, but does not include any remarks about the specifications of the infrastructure.

6.2 Number Portability Establishment Processes

6.2.1 Number Portability Establishment Process Description

This is the process by which the Number Portability capability is implemented in the participating operators' networks and Operational Support Systems. This involves implementation of the Serving Network functionality, and of the ability to route based upon the Routeing Number.

It is recommended that Verification and Validation Testing of network and OSS Databuild occurs in this process.

6.2.2 Rationale for the Establishment of Number Portability

This process is required because prior to Number Portability, Serving Network functionality was not required. Also there was not a requirement for use of Routeing Numbers.

6.2.3 Information Flows

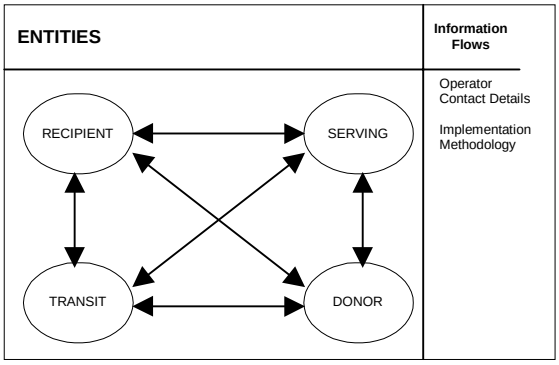


Figure 5

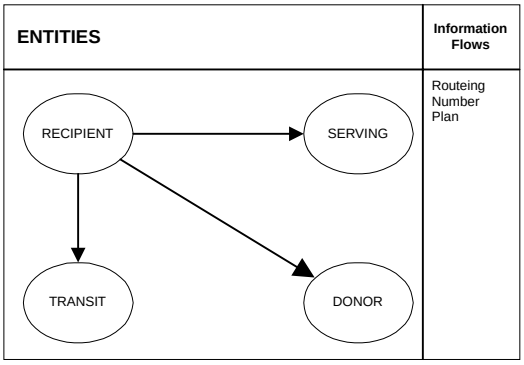


Figure 6

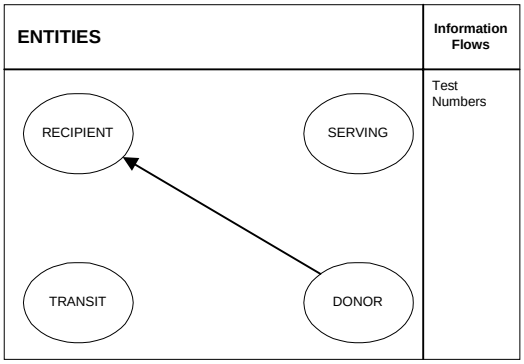


Figure 7

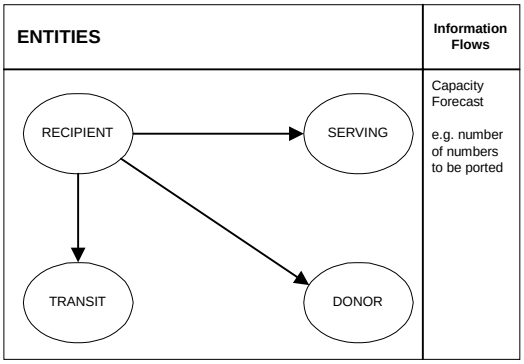


Figure 8

6.2.4 Escalation Procedures

This process is the basis upon which operators will perform Number Portability. Therefore any failure to reach agreement during this process will necessitate escalation to an appropriate regulatory, or arbitration, body.

6.3 Number Portability Maintenance Processes

This subclause defines the processes required to maintain the Number Portability capability between Service Providers following completion of the Establishment process. It details new procedures and identifies links to existing interconnect procedures which should be operating as business as usual, i.e. forecasting, route provision, etc.

6.3.1 Network Changes

6.3.1.1 Network Changes Process Description

This process is used when operators make changes to their networks (either internal or to Points of Interconnect) which affect the Routeing plan agreed during the Establishment process.

6.3.1.2 Rationale for the Network Change Process

As operators evolve their networks to meet the ever-growing demand, network changes need to be reflected in the Number Portability Routeing plan.

Examples of when such changes can occur, dependent upon the architectural solution, are:

a) introduction of new numbering resource;

b) movement of numbering resources within networks (this may change the Point of Interconnect, depending upon the solution used);

c) new routes are made available;

d) code and number changes.

6.3.1.3 Information Flows

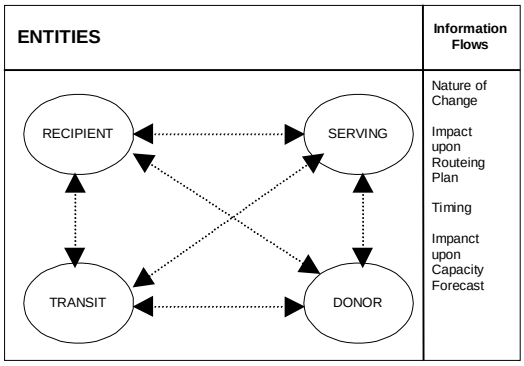


Figure 9

6.3.1.4 Escalation Procedures

As these processes occur at an operational level, failure to resolve issues by operational staff will result in escalation to already identified Higher Level Interconnect Managers for resolution.

6.3.2 Capacity Planning

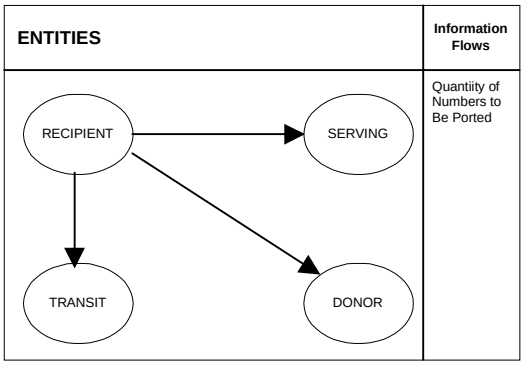
6.3.2.1 Description of the Capacity Planning Process.

This is the process by which operators exchange information as to forecast capacity requirements between (and in certain circumstances within) networks.

6.3.2.2 Rationale for the Capacity Planning Process

In certain scenarios, for example, All Call Query, this incremental process is not required above "business as usual" processes. However for implementations where the Donor Network performs some, or all of, the Serving Network functionality, these processes are required in order that the Donor Network (and Transit Networks if applicable) are appropriately dimensioned.

6.3.2.3 Information Flows



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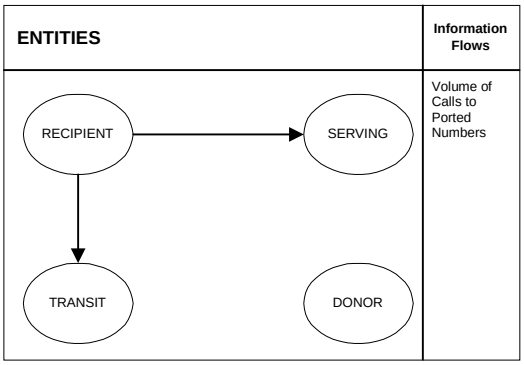


Figure 11

6.3.2.4 Escalation Procedures

As these processes occur at an operational level, failure to resolve issues by operational staff will result in escalation to already identified Higher Level Interconnect Managers for resolution.

6.3.3 Customer Changes

6.3.3.1 Description of the Customer Changes Process

This is the process by which a change to the Routeing Number used to complete calls to a particular customer is registered.

6.3.3.2 Rationale for the Customer Changes Process

This process is required to allow movement of customers within the recipient network.

NOTE: If the implementation adopted is such that the routeing number identifies only the recipient network, or Routeing Numbers are not passed across network boundaries, this process is not required.

6.3.3.3 Information Flows

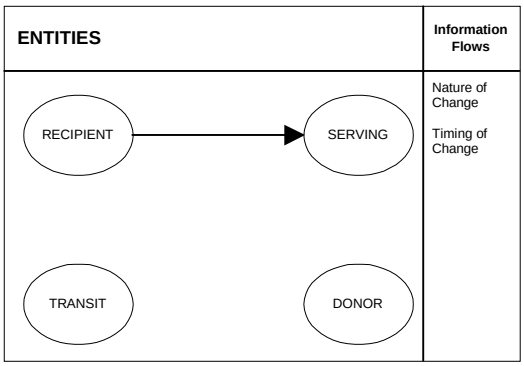


Figure 12

6.3.3.4 Escalation Procedures

As these processes occur at an operational level, failure to resolve issues by operational staff will result in escalation to already identified Higher Level Interconnect Managers for resolution.

6.4 Number Portability Porting Processes

6.4.1 Sequence of Events During Porting Processes

The porting processes must be designed to minimize disruption for the customer. Therefore, the sequence of events is very important, especially for directly involved entities. In this clause, the sequence of events is explained. The flow is applicable to the Porting Process, to the Return to Donor process, and to the Subsequent Portability Process; exception processes are not described in this clause.

Typically, there are four phases to porting a number, as follows:

6.4.1.1 Administrative Phase

This phase is initiated by a customer obtaining service from the recipient service provider requesting that they retain their existing number. During this phase, the recipient service provider will have to ensure that there are no issues which will prevent the number from being ported, by co-ordinating with the relinquishing (and if appropriate donor) service providers.

6.4.1.2 Preparation Phase

This phase involves the preparation of the affected networks to carry out the port of the number.

6.4.1.3 Porting Phase

This phase is when the port of the number actually takes place. Typically, the changes in the recipient network will be activated, then the serving, donor and/or relinquishing networks will activate the relevant changes to implement the port of the number.

The order of activating network changes is determined by the use of routeing numbers in delivery of calls to numbers that have been ported. Two cases can be distinguished.

6.4.1.4 Case 1

A serving network supplies a routeing number for routeing the call to the recipient exchange, or to the network termination point in the recipient network. In this case the order of notification is first recipient network then serving networks.

6.4.1.5 Case 2

A serving network supplies a routeing number for routeing the call to the recipient network, or a point of interconnect of the recipient network, or supplies a routeing number for routeing internal in the serving network only. In this case the order is first recipient network, then relinquishing network and finally serving network(s).

6.4.1.6 Information Phase

This phase informs other affected parties that the port has taken place. Typically, this will include:

- organizations responsible for directory enquiry services, see subclause 6.6.1;
- administrators of billing systems, see subclause 6.6.2;
- regulatory bodies (e.g. Numbering Plan Administration (NPA)) where regulations require this, see subclause 6.6.3;
- Emergency Services Enterprise (ESE) responsible for the public emergency service, see subclause 6.6.4;
- Law Enforcement Agencies (LEA) responsible for lawful interception, see subclause 6.6.5.

The elapsed times for preparation of porting and execution of porting and also the opening hours for porting is important to determine the expected interval between steps and more importantly to the entities not directly involved.

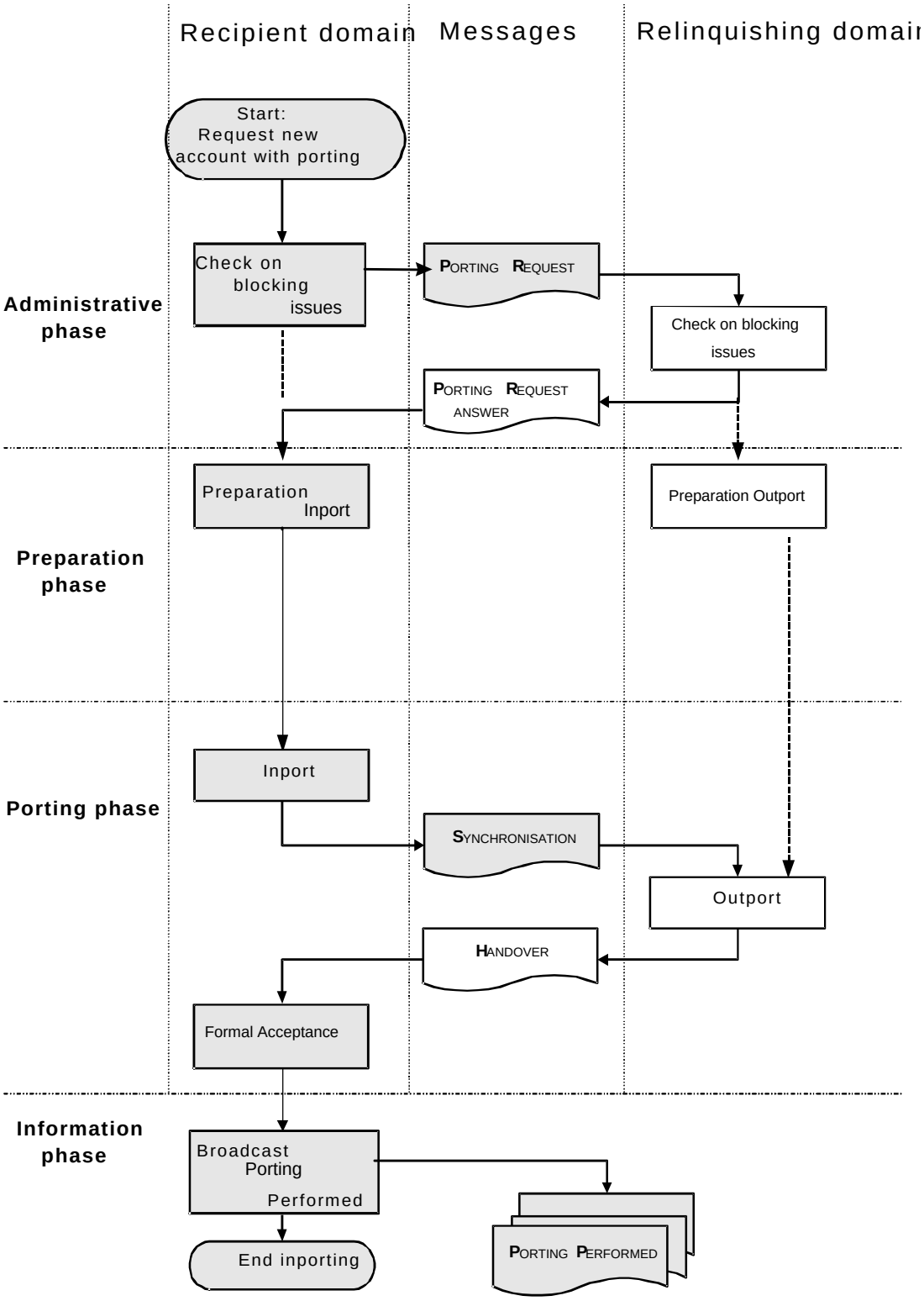

Recipient domain
Messages
Relinquishing domain
Start:
Request new
account with porting
Check on
blocking
issues
PORTING REQUEST
Check on blocking
issues
PORTING REQUEST
ANSWER
Administrative
phase
Preparation
Inport
Preparation Outport
Preparation
phase
Inport
SYNCHRONISATION
Outport
HANDOVER
Porting phase
Formal Acceptance
Broadcast
Porting
Performed
End inporting
PORTING PERFORMED
Information
phase

Figure 13

6.4.2 Porting Processes

There are four main types of Number Porting. These are:

a) initial porting;

b) subsequent porting;

c) return to donor;

d) customer cessation.

6.4.2.1 Initial Porting Process

6.4.2.1.1 Geographic Numbers

Single Line Porting Process.

6.4.2.1.2 Description of the Single Line Porting Process

This is the process by which an individual customer (single line) ports from a Donor Network to a Recipient Network.

6.4.2.1.3 Rationale for the Single Line Porting Process

In order to allow customers to change their service provider whilst retaining the same ITU-T Recommendation E.164 [2] Public Telecommunication Number.

6.4.2.1.4 Information flows

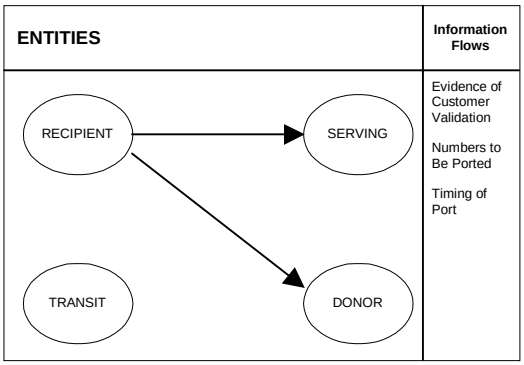


Figure 14

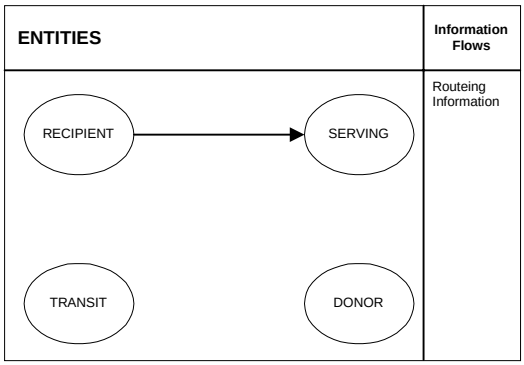
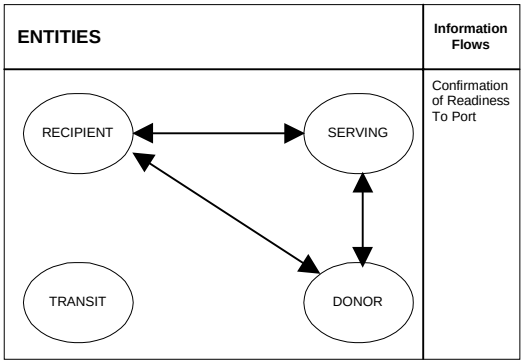
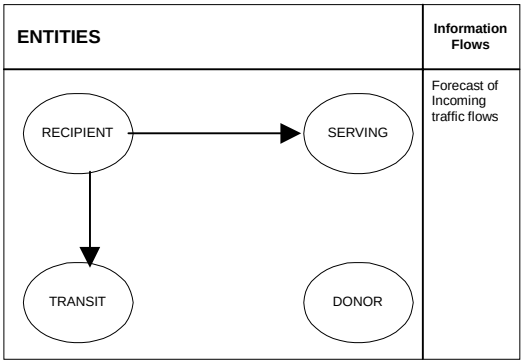


Figure 15

NOTE: In certain implementations, which do not use routeing numbers, the exchange of this information may not be required.





NOTE: This figure would only be included in the case of multi-line ports.

Figure 16 **Figure 17**

Escalation Procedures: As these processes occur at an operational level, failure to resolve issues by operational staff will result in escalation to already identified Higher Level Interconnect Managers for resolution.

6.4.2.1.5 Non-Geographic Numbers Porting Process

Void.

6.4.2.1.6 Description of the Non-Geographic Number Porting Process

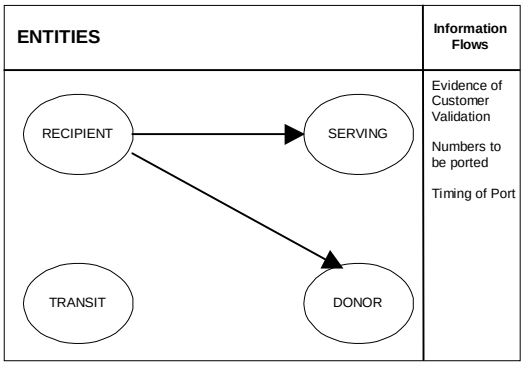
This is the process by which an individual customer, with a non-geographic number, ports from a Donor Network to a Recipient Network.

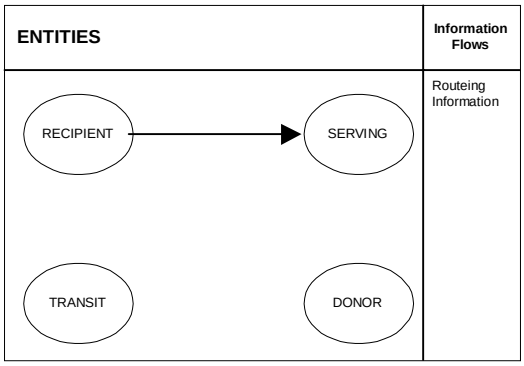
6.4.2.1.7 Rationale for the Non-Geographic Number Porting Process

In order to allow customers to change their non-geographic service provider whilst retaining the same ITU-T Recommendation E.164 [2] Public Telecommunication Number(s).

6.4.2.1.8 Information Flows

Where non-geographic numbers are allocated on an individual basis by a central administrative authority, there is no "donor" network, so information flows to/from donor network operators in the diagrams below should be treated as being from the relinquishing network.





NOTE: In certain implementations, which do not use routeing numbers, the exchange of this information may not be required.

Figure 18 **Figure 19**

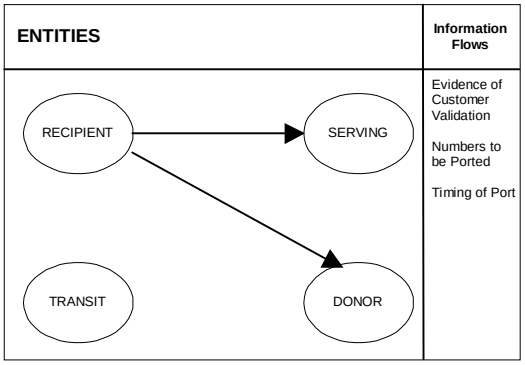


Figure 20

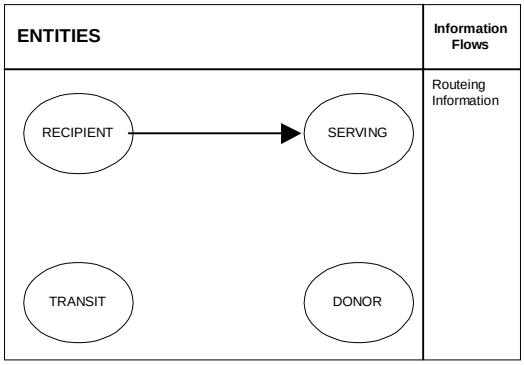


Figure 21

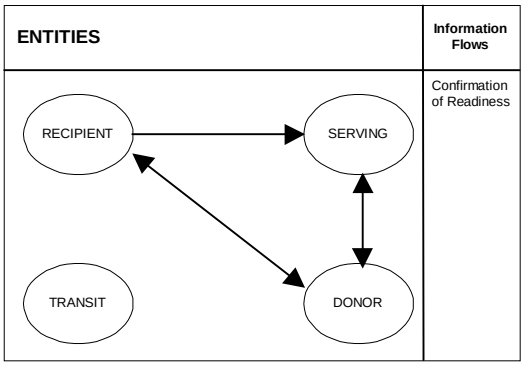


Figure 22

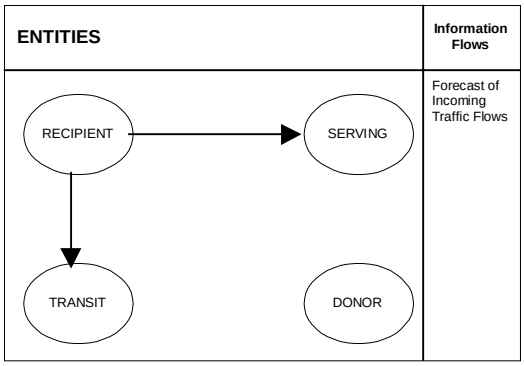


Figure 23

NOTE: In certain implementations, which do not use routeing numbers, the exchange of this information may not be required.

6.4.2.1.9 Escalation Procedures

As these processes occur at an operational level, failure to resolve issues by operational staff will result in escalation to already identified Higher Level Interconnect Managers for resolution.

6.4.2.1.10 Subsequent Portability Process

Void.

6.4.2.1.11 Description of a Subsequent Portability Process

This is the process by which an individual customer ports from a one Recipient Network to another.

6.4.2.1.12 Rationale for the Subsequent Portability Process

In order to allow customers to change their service provider whilst retaining the same ITU-T Recommendation E.164 [2] Public Telecommunication Number.

6.4.2.1.13 Information Flows

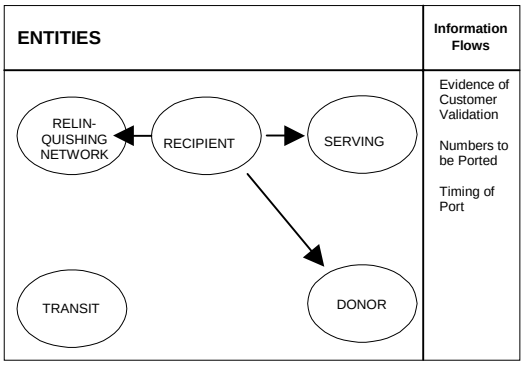


Figure 24

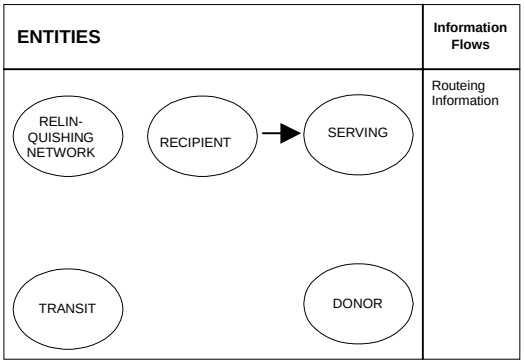
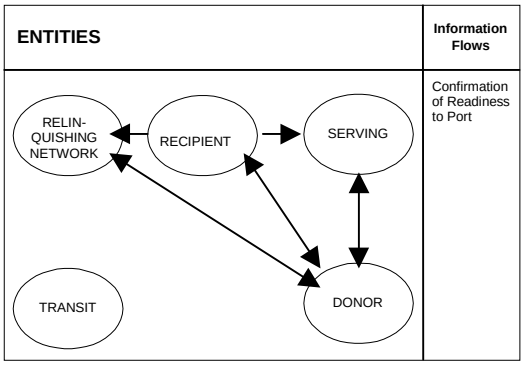


Figure 25



NOTE: In certain implementations, which do not use routeing numbers, the exchange of this information may not be required.

Figure 26

6.4.2.1.14 Escalation Procedure

As these processes occur at an operational level, failure to resolve issues by operational staff will result in escalation to already identified Higher Level Interconnect Managers for resolution.

Note on Initial porting vs. Subsequent Portability Process.

The only difference between the Initial Porting Process and the Subsequent Portability Process is that in the Initial Porting Process the Donor Network and the Relinquishing Network are the same entity, whereas the Subsequent Portability Process these entities must be distinguished. As in the Initial Porting Process the Donor network and the Relinquishing network are the same, information flows which are exchanged between them in the Subsequent Portability Process, are superfluous in the Initial Porting Process. Except for this difference, information flows between entities are the same in both processes.

6.4.2.2 Void

6.4.2.3 Return to Donor Process

6.4.2.3.1 Description of the return to Donor Process

This is the process by which an individual customer returns to the Donor Network that originally served them.

NOTE: This is only relevant where numbers are assigned in ranges to operators.

6.4.2.3.2 Rationale for the return to Donor Process

In order to allow customers to change their service provider whilst retaining the same ITU-T Recommendation E.164 [2] Public Telecommunication Number.

6.4.2.3.3 Information Flows

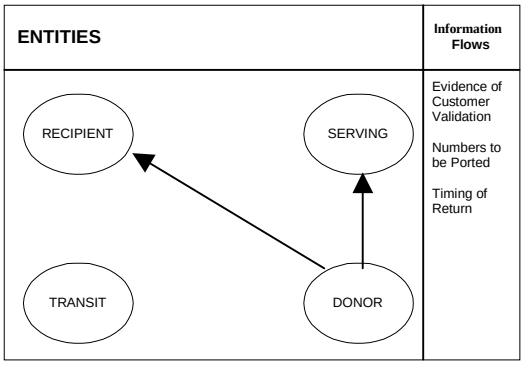


Figure 27

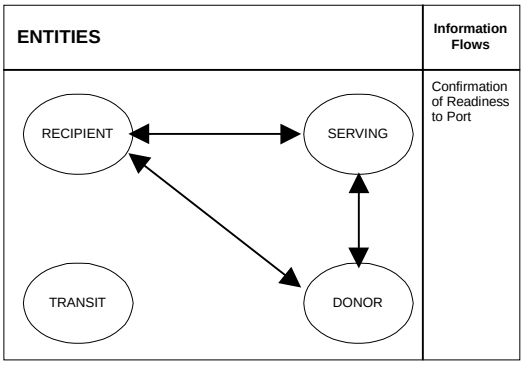


Figure 28

6.4.2.3.4 Escalation Procedures

As these processes occur at an operational level, failure to resolve issues by operational staff will result in escalation to already identified Higher Level Interconnect Managers for resolution.

6.4.2.4 Customer Cessation Process

6.4.2.4.1 Description of the Customer Cessation Process

This is the process by which a number is returned to the Donor network following a ported customer ceasing service.

NOTE: This is only relevant where numbers are assigned in ranges to operators.

6.4.2.4.2 Rationale for the Customer Cessation Process

In many regulatory environments, a condition is placed that ported numbers should revert to the Donor if the customer ceases to take service.

6.4.2.4.3 Information Flows

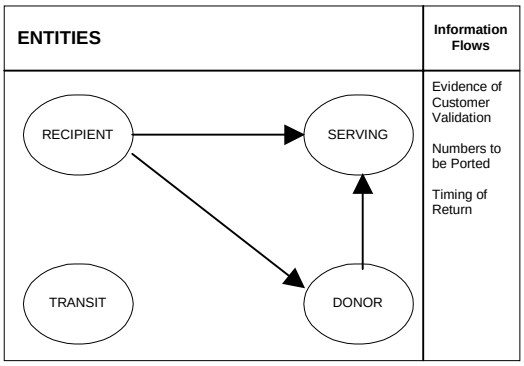


Figure 29

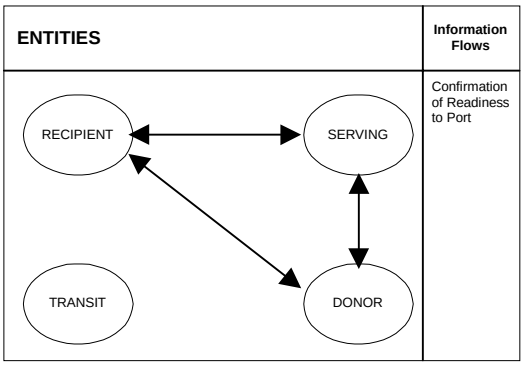


Figure 30

6.4.2.4.4 Escalation Procedures

As these processes occur at an operational level, failure to resolve issues by operational staff will result in escalation to already identified Higher Level Interconnect Managers for resolution.

6.5 Number Portability Fault Handling Processes

6.5.1 Fault Identified During Porting

6.5.1.1 Description of the "Fault Identified During Porting" Processes

These processes encapsulate the fault handling procedures to be used if a port is unsuccessful.

6.5.1.2 Rationale for the "Fault Identified During Porting" Processes

These processes are required to assure that a seamless service is provided to customers.

6.5.1.3 Information Flows

SCENARIO	DIALOGUE TO ENABLE PROGRESSION OF FAULT-HANDLING BETWEEN OPERATORS
Recipient Network identifies port has failed	Recipient notifies donor, attempt made to rectify fault. If unsuccessful, is put on hold until fault is rectified, or cancelled by recipient.
Donor or Serving Network identifies Port has failed	Donor or Serving notifies recipient, attempt made to rectify fault. If unsuccessful, port is put on hold until fault is rectified, or cancelled by the recipient.

6.5.2 Fault identified after porting

6.5.2.1 Description of the 'Fault Identified After Porting' process

These processes encapsulate the fault handling procedures to be used if a fault subsequently develops on the routeing of calls to a ported number.

6.5.2.2 Rationale for the 'Fault Identified After Porting' Process

These processes are required to assure that a seamless service is maintained for customers.

6.5.2.3 Information Flows

SCENARIO	DIALOGUE TO ENABLE PROGRESSION OF FAULT-HANDLING BETWEEN OPERATORS
Imported Customer making outgoing call	Recipient - Called customer's operator
Incoming call to imported number: From a recipient customer	Recipient – Serving
Incoming call to imported number: From a donor customer	Donor - Recipient – Donor (Donor and Recipient Operator Services check status of line)
Incoming call to imported number: From a third party customer (where third party operator can identify the number as ported)	Third Operator - Recipient – Serving
Incoming call to imported number: From a third party customer (where third party operator cannot identify the number as ported)	Third Operator - Donor - (Donor Operator Service re-direct) - Recipient – Serving

6.5.2.4 Escalation Procedures

As these processes occur at an operational level, failure to resolve issues by operational staff will result in escalation to already identified Higher Level Interconnect Managers for resolution.

6.6 Number Portability Ancillary Processes

6.6.1 Directory Enquiry

6.6.1.1 Description of the Directory Enquiry Process

This is the process by which it is ensured that a customer continues to have an appropriate entry in Directory Information Systems.

6.6.1.2 Rationale for the Directory Enquiry Process

These processes are required to ensure that customers who have ported maintain a comparable DQ service as those who have not, irrespective of serving operator and DQ supplier.

6.6.1.3 Information Flows

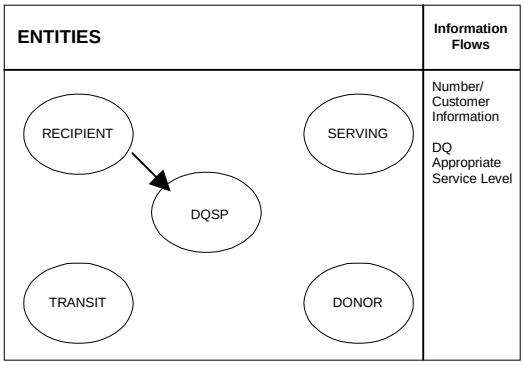


Figure 31

6.6.1.4 Escalation Procedures

As these processes occur at an operational level, failure to resolve issues by operational staff will result in escalation to already identified Higher Level Interconnect Managers for resolution.

NOTE: In some regulatory environments this process may not apply.

6.6.2 Billing

6.6.2.1 Description for the Billing Process

These processes encapsulate wholesale billing for the porting of customers and, if applicable, for routeing of calls to ported customers.

6.6.2.2 Rationale for the Billing Process

The Regulatory regime may allow donor operators to make a charge to recipient operators for the porting process, and additionally may allow operators providing serving network functionality to make a per-call charge (and possible per-call attempt charge) for the provision thereof. Processes may therefore be required to provide billings information between operators.

6.6.2.3 Information Flows

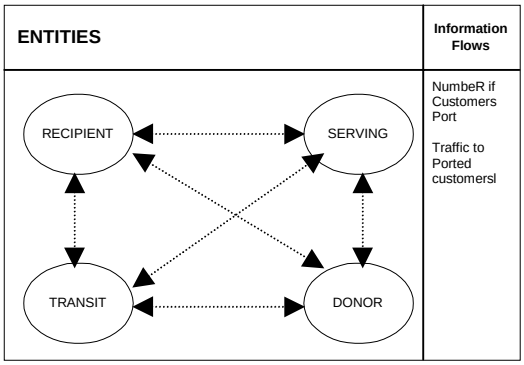


Figure 32

6.6.2.4 Escalation Procedures

As these processes occur at an operational level, failure to resolve issues by operational staff will result in escalation to already identified Higher Level Interconnect Managers for resolution.

6.6.3 Numbering Plan Administration

6.6.3.1 Description of the Numbering Plan Administration process

This is the process which ensures that the NPA continues to have correct information about the numbering plan after introduction of number portability.

6.6.3.2 Rationale for the Numbering Plan Administration process

These processes are required so that the NPA always has the correct status of the numbering plan.

6.6.3.3 Information flows

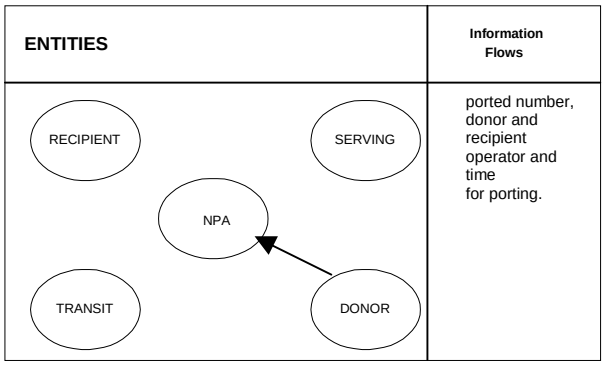


Figure 33

6.6.3.4 Escalation procedures

In some countries this requirement is required by regulation from the NRA.

6.6.4 Public Emergency Services

6.6.4.1 Description of the process for the public emergency services

This is the process which ensures that the ESE continues to have correct information about ported number for the purpose of emergency calls after introduction of number portability.

6.6.4.2 Rationale for the public emergency services process

These processes are required so that the ESE always has the correct status of subscribers (ported and non-ported) that use the public emergency services.

6.6.4.3 Information flows

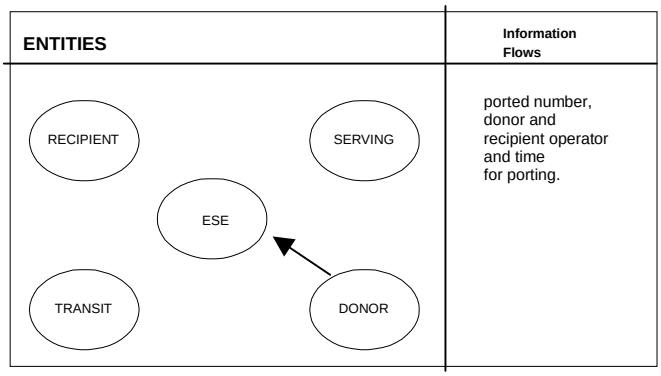


Figure 34

6.6.4.4 Escalation procedures

In some countries this requirement is required by law or regulation.

6.6.5 Law Enforcement Agencies

6.6.5.1 Description of the process for the Law Enforcement Agencies

This is the process which ensures that the LEA continues to have correct information about ported number that for the moment is under lawful interception after introduction of number portability.

6.6.5.2 Rationale for the Law Enforcement Agencies Process

These processes are required so that the LEA always has the correct status of subscribers (ported and non-ported) that for the time being is under lawful interception.

6.6.5.3 Information flows

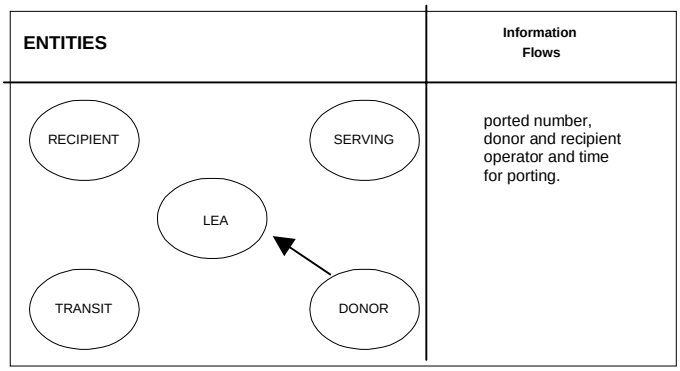


Figure 35

6.6.5.4 Escalation procedures

In some countries this requirement is required by law or regulation.

History

Document history		
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