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**Services and Protocols for Advanced Networks (SPAN);
Number portability for ETNS services**



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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN), and is now submitted for the Vote phase of the ETSI standards Two-step Approval Procedure.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
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Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

1 Scope

The scope of the present document is to investigate aspects related to number portability for ETNS services using a European Telephony Number Space (ETNS). In this study the focus is on the number portability between Service Providers (SP) i.e. a customer can move from one ETNS Service Provider (SP) to another and retain a European Number for that service.

The present document describes the main technical requirements and features of number portability in the context of an ETNS service and discusses the technologies available today and in the near future for realizing number portability in an efficient way whilst trying as much as possible to minimize the impacts on the network.

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 and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [1] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".
- [2] ETSI EN 301 161: "Management of the European Telephony Numbering Space (ETNS)".
- [3] ETSI EN 301 160: "Routeing of calls to European Telephony Numbering Space (ETNS) services".
- [4] ITU-T Recommendation E.353: "Routing of calls when using international network routing addresses".
- [5] ETSI TR 101 079: "Network Aspects (NA); Routeing of calls to pan-European services using European Telephony Numbering Space (ETNS)".
- [6] ETO Report: "Management, Routeing and Portability aspects of the European Telephony Numbering Space (ETNS), June 1998".

<http://www.eto.dk/downloads/Numbering%20reports/ETNS-MR&P.pdf>

3 Definitions and abbreviations

3.1 Definitions

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

assisted network: network which routes all the calls to an ETNS number towards a serving network it has agreement with in order to complete the call

called party: entity that terminates a call to an ETNS number

calling party: entity that dials an ETNS number

ETNS administrative database: part of the ETNS registrar database where administrative data for each European Number is registered

ETNS number: See clause 5.2 of EN 301 161 [2].

ETNS registrar database: database maintained by the Registrar where all data, both administrative and operational, for each ETNS number are registered

ETNS routeing number: ITU-T Recommendation E.164 number used to route to the service exchange

NOTE: It can also identify the called party, the ETNS service provider/producer, and/or the originating network. ITU-T Recommendation E.353 [4] is an alternative in the future.

ETNS routeing/portability database: part of the ETNS registrar database where all operational data necessary to routeing and portability e.g. routeing numbers for each European Number is registered

ETNS service producer: functional entity producing the ETNS service(s) in question, having real-time control of the service(s)

NOTE: See clause 4 of EN 301 161 [2] for the relationship between service producer and service provider.

ETNS service producer database: database from which the requested ETNS service is provided

NOTE: The service **producer** database translates the routeing number or ETNS number into a terminating number.

ETNS service provider: functional entity that provides one or more ETNS service(s) to its ETNS subscribers on a contractual basis and is not involved in real-time control of the service

NOTE: See clause 4 of EN 301 161 [2] for the relationship between service producer and service provider.

ETNS translation database: capability which, in the call process, translates the ETNS number into a routeing number

location independent number: number without any geographic information on the physical location of the called party i.e. ETNS number (En)

NOTE: A location independent number like an En cannot be used directly to route the call towards the physical location of the called party. To perform the routeing the location independent number is translated into a routeing number. Figure 1 shows the logical relationship between the terminating number, the routeing number and the En that is a specific location independent number.

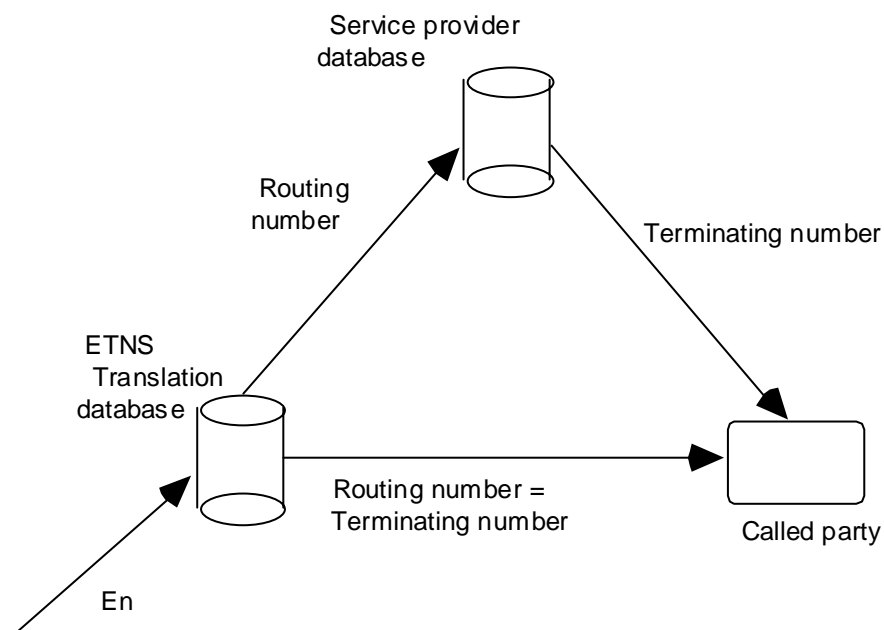


Figure 1: Relationship between En, routeing number and terminating number

number portability for ETNS services: feature that allows a customer of an ETNS service to change the provider of this specific service whilst retaining the same En

originating network: network, either assisted or serving, to which the calling party is connected

service exchange: exchange of the service network that triggers the provision of the service on reception of the routing number, and then forwards the call

service network: network that operates one or more service exchange(s)

serving exchange: exchange, in the serving network, that can interrogate directly or indirectly an ETNS translation database to obtain a routing number related to the ETNS number, and then forwards the call to the service network

serving network: network, with one or more serving exchanges

tariff: set of data used for the determination of utilization charges for used services

terminating number: number containing explicit information on the termination point of the called party

NOTE: The number is used to route towards the called party.

3.2 Abbreviations

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

En	ETNS number
ESI	European Service Identifier
ETNS	European Telephony Numbering Space
IN CS2	Intelligent Network Capability Set 2
NNA	National Numbering Authority
R	Registrar
Rn	Routeing number
SgN	Serving Network
SP	Service Provider

4 Executive summary

The portability of European Numbers between service provider for the same service is one the primary requirements that the ETNS satisfies.

The ETNS number contains no service provider indication, thus supporting number portability between service providers.

From the point of view of the technical management of the ETNS resource, number portability has some impacts. In particular, the registrar that is responsible for the handling of the subscriber number in the En manages a database (called the ETNS registrar database) to record the status of ETNS numbers, including information such as the routing number, the subscriber and service provider identity, etc. When an En is ported, the service providers involved must inform the registrar that the En has been transferred from the recipient service provider to the donor service provider. The transfer of an En must be recorded in the ETNS administrative database. The ETNS administrative database is the portion of the ETNS registrar database which contains only administrative information. In the initial phase, the interactions between the registrar (ETNS administrative database) and service providers may not be automatic, requiring the involvement of a human operator. In a later phase, it would be beneficial to adopt fully automatic transactions between the registrar and service providers to avoid an unsatisfactory quality of service.

The En is a location independent number that needs to be translated into a routing number to properly route the ETNS call. This translation is performed by a network element called the ETNS translation database. When an En is ported between two service providers, the routing number associated with the En usually changes. Supporting number portability from the routing point of view means updating the association between an En and a routing number in the ETNS translation database. In the updating of the ETNS translation database a key role is played by the ETNS routing/portability database, which is the portion of the ETNS registrar database that contains certain administrative information and routing information. The communication between the ETNS routing/portability database and the ETNS translation database can, in the initial phase, be based on the use of manual procedures.(e.g. fax, e-mail, etc.). In later phase, the use of automatic updating capabilities without human involvement should be investigated. In the long term, we can investigate the updating of the ETNS translation database via the use of IN Capability Set 2. The availability and, above all, the suitability of IN CS2 to support communication between the ETNS routing/portability database and the ETNS translation database must still be proven.

5 Background

The new emerging developments in the telecommunications market and the European Union are placing new requirements on the numbering of telecommunication services. One of the most important requirements is the creation, in parallel to the present national numbering plans, of an ETNS to provide pan-European services.

The provision of number portability between service providers for ETNS services is widely recognized as a key factor to develop and strengthen a competitive service market on an European basis. The entry and the growth of new service providers will be facilitated by the possibility for a customer to change service provider whilst keeping his own ETNS number. Many entrant service providers feel the lack of number portability as an important barrier to their entry and success in the service market.

The aim of the present document is to describe what number portability for ETNS services means and identify technical solutions for realizing it.

6 General assumptions and requirements on number portability

This clause lists some general assumptions and requirements related to the portability of numbers belonging to the ETNS.

- 1) Only the ETNS number (not including prefixes and suffixes) is eligible to be ported.
- 2) Only the entire ETNS number is portable i.e. not a portion of it.
- 3) The privacy of a customer who has ported his number should be guaranteed.
- 4) The calling party should not be able to recognize that it is calling a ported number.
- 5) Number portability should not normally influence the charge to the calling user.

It is recognized that the provision of ETNS number portability within the newly created number space cannot be compared with the provision of number portability within a national numbering scheme.

7 Reference model for the ETNS

This clause provides a conceptual description of the implementation of the ETNS. Figure 2 shows the actors involved in the ETNS, and their relationship with each other. Also shown in figure 2 are the relevant reference points for the ETNS that are described in clauses 7.2 and 7.3. Figure 2 is divided into call-related and non call-related parts in order to clearly show the distinction between the routing functions and the management functions. The following reference model reflects only the management and routing aspects of the non-call and call related parts, respectively.

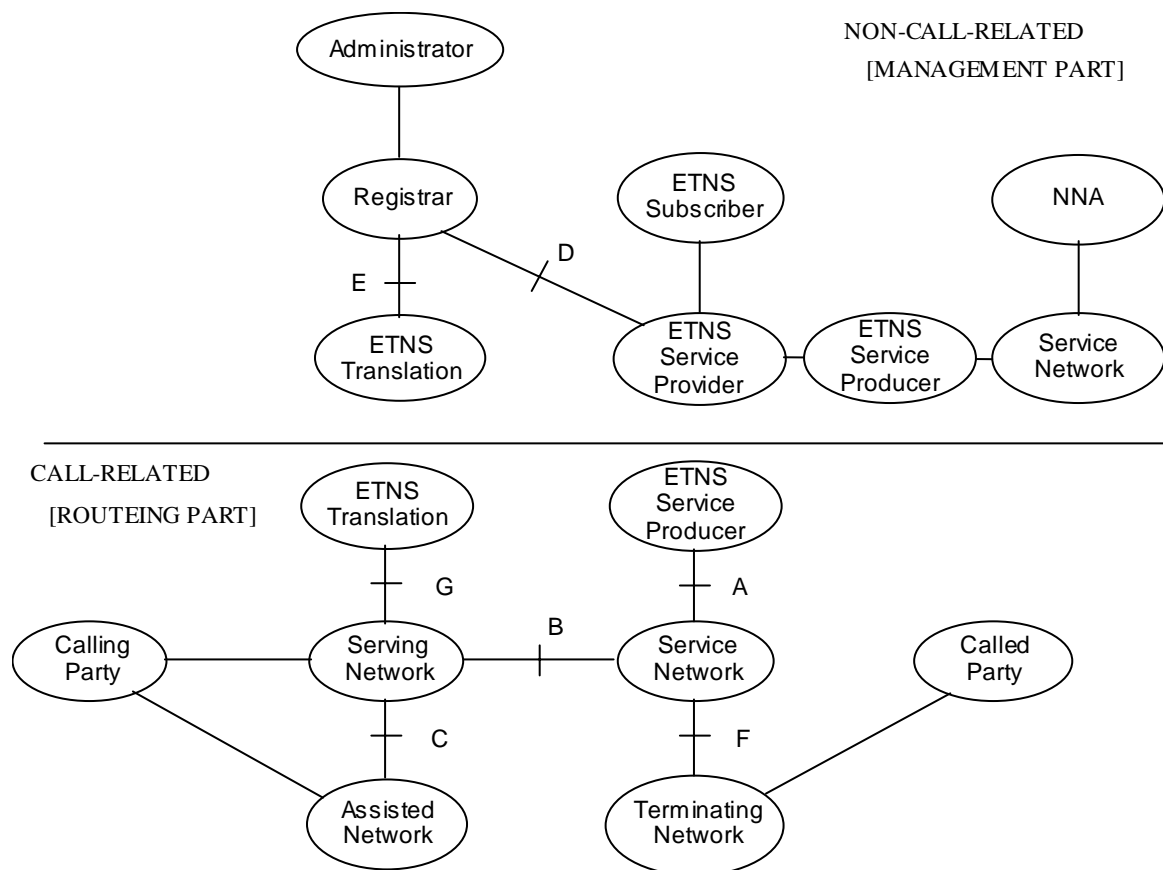


Figure 2: Actors and reference points

The reference points in the management (non call-related) part of the figure 2 are used in the present document, while the reference points in the call-related part are used in TR 101 079 [5] and EN 301 160 [3].

The ETNS service provider is the entity that is relevant in the process of number assignment. The service network is the entity that is relevant in call processing. One single entity may be both the ETNS service producer and the service network, or they may be different entities; in the latter, the entity that assumes the function of ETNS service producer may or may not participate in the call process. Such a distinction leads to recognize two concepts under the word "service provision": the function of the first is to sell a service to a ETNS subscriber, and to be the sole interface with this ETNS subscriber, this is the role of the ETNS service provider; the function of the second is to operate the call, this is the role of the service producer.

The Serving Network (SgN) is responsible for routing a call from the calling party to the service network. The service network (and potentially the service producer) is (are) responsible for providing the service itself.

EnS are managed by independent authorities which are identified as the registrar and the administrator in figure 2.

7.1 Call-related [Routeing part]

This clause describes the principles for routing a call from the calling party to the called party. This is studied in detail in TR 101 079 [5] and EN 301 160 [3]. A call to an En can be divided in two parts.

7.1.1 First leg: getting the routing number

The calling party shall dial the En in its international format.

Based on the European Service Identifier (ESI), the call is routed to the serving exchange in the SgN. Potentially, this exchange may not be located in the calling party's network. The originating network is then called an assisted network, interconnected to the SgN through reference point C. An assisted network can be connected to different SgNs, e.g. for routing differently depending on the ESI, or it can redirect all ETNS calls to one SgN.

The serving exchange, analysing the ESI, triggers the ETNS translation database to translate the incoming En into an outgoing Routing number (Rn). The ETNS translation database can be inside or outside the SgN, e.g. when several SgNs share the same ETNS translation database. The Rns can vary from a SgN to another.

Whether the area from which a single En is accessible relies on a subscription or not, is service dependent.

This ends the first leg of the call which consists of routing the call to the service exchange.

7.1.2 Second leg: providing the ETNS service

The proceeding of the call set up in the service network and beyond depends on the nature of the service on the one side, and on the relationship between the ETNS service producer and the service network on the other side.

The nature of the service will determine the path of the call, whether it terminates to the subscriber or to a recorded announcement, whether it needs a second number translation or not, etc. These features are service dependent and are outside the scope of the present document.

The relationship between the ETNS service producer and the service network will determine the responsibilities of each actor as regards service provision. The two actors can be the same entity which operates the service, or the ETNS service producer can rely upon the telecommunication infrastructure of a different service network and only operate e.g. a database when a double translation is required. The implementation of reference point A between the service network and the service producer depends on the technical constraints related to the service, and on the regulatory environment.

7.1.3 Service provision by the serving network

Figure 3 depicts some examples of call configurations. Where the SgN and the service network are the same, the serving exchange and the service exchange can also be the same, and reference point B is then internal.

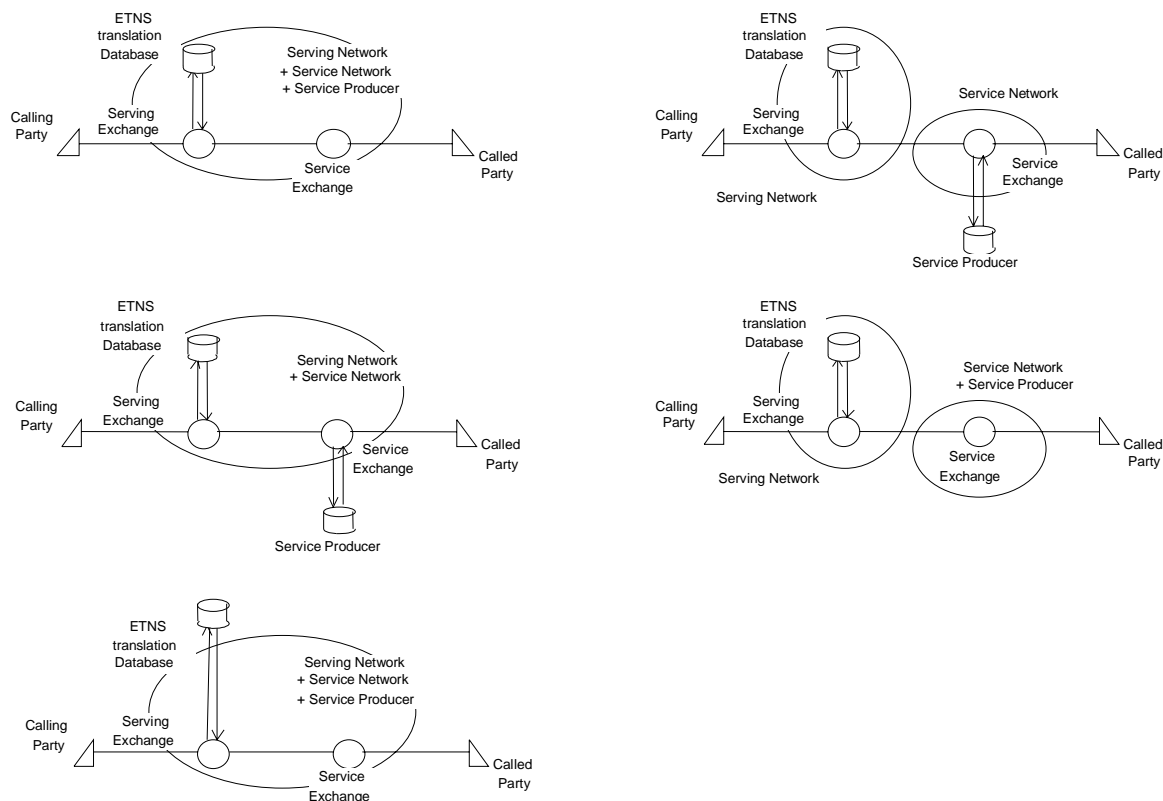


Figure 3: Examples of call configurations

Note that in figure 3, the calling and the called parties do not need to be directly connected to the serving and the service networks respectively. It should be noted that the translation database should provide the capability to translate the ETNS number into a routing number. The translation database capability can be provided in a number of ways, e.g. Intelligent Network or internal switch translations.

7.2 Non-call related [Management part]

Two functions are performed in the management process. The first is the number assignment process. The second is the distribution of ETNS routing numbers to SgNs.

7.2.1 ETNS number assignment

The ETNS registrar database is primarily used in the interaction between the registrar and service providers for number assignment. Procedures are outlined in the ETO Report [6].

7.2.2 Obtaining Routing numbers (Rns)

ETNS service providers will have to negotiate with the service producer and service network to obtain Rns.

7.2.3 Distribution of Routing numbers (Rns)

The distribution of routing information to the SgNs occurs e.g. when:

- a new En has been assigned;
- coverage of an En has changed;
- an En has been withdrawn;
- a change of ETNS service network has occurred;
- a change of ETNS service provider has occurred, that may entail new Rns.

The procedure for the distribution of the Rns to the SgNs shall take place through the registrar. It is assumed that the ETNS service provider has obtained the Rns from the service producer/Service network(s) it has agreement with.

The ETNS service provider shall inform the registrar of the Rns and its connected En. The registrar distributes Rns and their connected Ens to the SgNs. This is shown in figure 4.

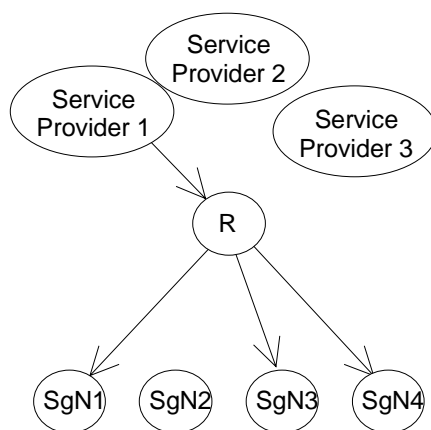


Figure 4: Distribution of routing numbers

Figure 5 recaps the three previous figures for an overview of the ETNS architecture.

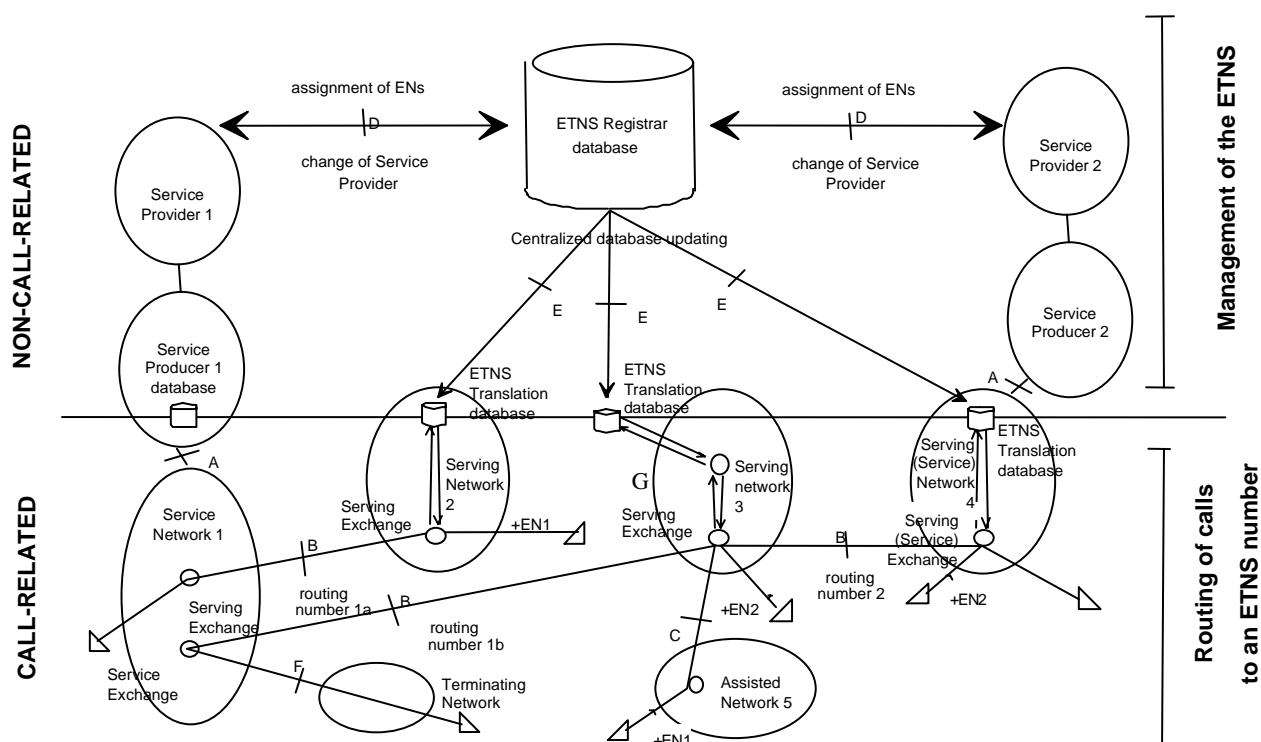


Figure 5: ETNS reference architecture

In the short-term it is anticipated that in the management part, the interfaces that require the transfer of information will be a manual process. In the long-term, it is anticipated that mechanized interfaces will be developed and deployed as the services grow and the number of subscribers and changes reaches a point where manual processes are no longer sufficient to accommodate the manual collection and distribution of information.

8 Routeing aspects

In general terms the implementation of number portability affects the routeing procedures. When a number is ported it cannot be used as "a routeing number" to reach the destination identified by the number itself. In other words the ported number is a location independent number which cannot be used to route the call towards the physical location of the called party. This location is reached by using another number, the routeing number, which contains explicit or implicit routeing information on the physical location of the customer.

It should be noted that, regardless of number portability, the ETNS number is by definition a location independent number. This means that to properly route an ETNS call, the En must be translated into a routeing number.

9 Number portability of an ETNS number

The ETNS number is not directly usable to get the physical location of the called party. To route a call, the En is translated into a routing number that is used to route the call.

When the ETNS number is ported from service provider A to service provider B, the change of service provider implies a new Rn if both service provider A and service provider B use different service networks (recognizing that Rns are assigned to service networks). If the two service providers use the same service network, it may not be necessary to change Rn.

It is assumed that, in most cases, porting of an En affects the association between Rn and service network. Therefore, in order to perform correctly the routing of ETNS calls to their final destination, the association between ETNS number and routing number must be modified.

This requires that the ETNS translation database responsible for managing the association between ETNS number and routing number is informed that the En has been ported and a new routing number corresponds to the ETNS number. Clause 11 describes the capabilities involved in the updating of the association between En and routing number.

10 Considerations on the technical management of the number portability for the ETNS

The portability of ETNS numbers impacts on the management of the ETNS resource. In particular the registrar that is responsible for the handling of the subscriber number behind the ESI plays an important role in the management of the ported ETNS numbers. The registrar must keep track of the status of the ETNS numbers allocated to the various service providers and then record whether a number has been ported or not.

To provide in an efficient way number portability, the following points should be taken into consideration:

- 1) For each European Number, the ETNS registrar database contains the administrative information and the requested operational information necessary for routing of an ETNS call and supporting number portability. From a functional point of view, we can split the ETNS registrar database into two. The first database is called the ETNS administrative database and contains only administrative information for each En. The second database is called the ETNS routing/portability database and contains part of the administrative information and the requested operational information (i.e. routing number) for each En that is necessary to support number portability.
- 2) The implementation and the handling of the ETNS administrative database and the ETNS routing/portability database are under the responsibility of the registrar. In particular it is highly desirable that the ETNS administrative database should be electronically accessible by the registrar and by all service providers.
- 3) Access to the ETNS administrative database by service providers must be secured. Only service providers recognized by the registrar must have access to the ETNS portability database.
- 4) The customer's information must be protected. A service provider can obtain only information related to the number status for the En assigned to another service provider.
- 5) The availability of the ETNS service should not depend on the real time availability of the ETNS administrative database.

Figure 6 shows the interaction for a specific ETNS service between the ETNS administrative database managed by the registrar and two service providers providing the service. With respect to the ETNS reference model described in clause 7, the interactions shown in figure 6 are the interactions that take place at the D interface. These interactions include the transfer of an ETNS number to/from a service provider, the retrieval by a service provider of information on the status of an En number, etc.

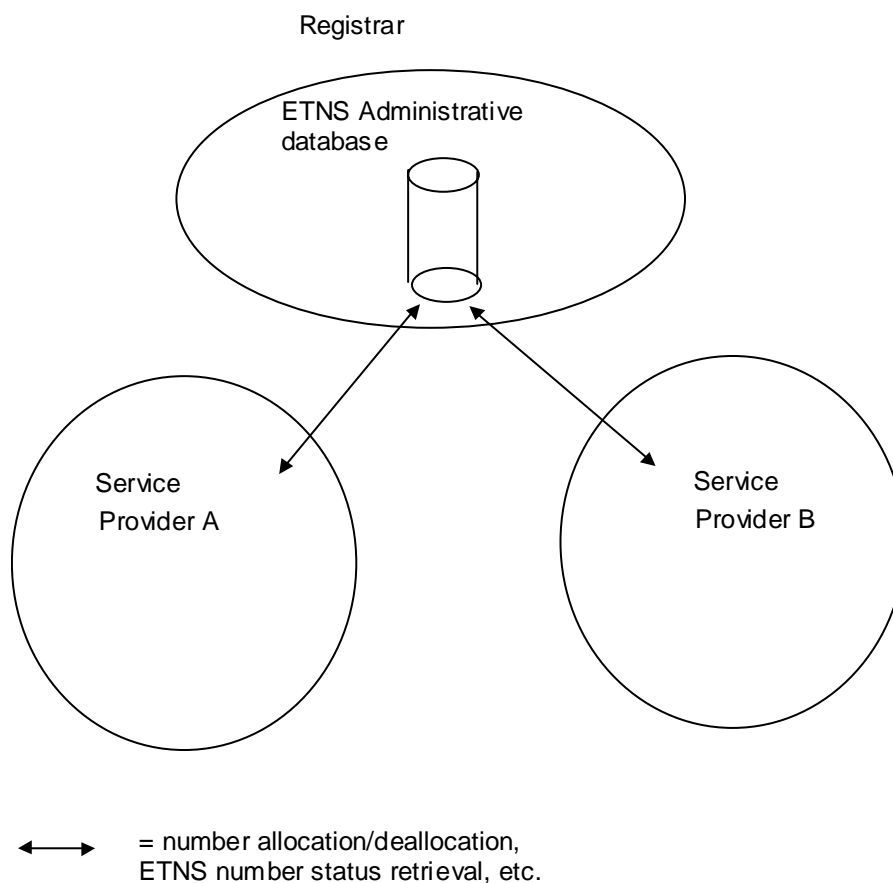


Figure 6: Interactions between ETNS administrative database and service provider

To allow communication between service providers and the ETNS administrative database managed by the registrar, it is necessary to define the appropriate interfaces. The interfaces can be either standardized or proprietary interfaces. In particular, the urgency of creating an ETNS administrative database in a short period of time that is accessible by service providers may imply the use of proprietary interfaces in the initial phase. In the medium term, the use of standardized interfaces is recommended.

In addition, in order to enable number portability as soon as possible in the initial phase, the interfaces and other interactions between service providers and the ETNS administrative database may not be fully automatic, requiring the involvement of human operators. This means, for example, that the number request and number allocation procedures are performed by sending fax messages or e-mail. In the long run, with the increase of interactions between the ETNS administrative database and service providers, it will be useful to limit as much as possible the involvement of the human operators by using automatic transactions based on standardized interfaces.

From the management point of view, when an En is ported from service provider A (Donor SP) to service provider B (recipient SP), some actions take place between the two service providers and the registrar. These actions can be summarized in three steps:

- 1) The recipient SP is responsible for informing the registrar that he has acquired a new customer with a ported En.
- 2) The registrar must record that the En indicated by the recipient service provider has now been ported from service provider A to service provider B.
- 3) The registrar must remove any connection between the ported En and the donor service provider.

The interactions between service providers and the registrar described above may take a certain amount of time, especially in the initial phase when these interactions will not be fully automatic. The use of non-automatic interactions based on the involvement of human operators may negatively affect the quality of the service offered to the customers of ETNS services. For example, when a customer moves from service provider A to service provider B, there may be a period of time when the service is not available due to the transfer procedures applying to the ported ETNS number.

11 Provision of ETNS number portability

In clause 11, there is a database (the ETNS routing/portability database) that contains both administrative and operational data pertinent to En. These data comprise information on the service provider and on the status of the En including the associated routing number.

The portability of an En between two service providers usually implies a change of the routing number associated with the ported ETNS number. It is the responsibility of the ETNS routing/portability database to inform the appropriate ETNS translation databases of the various serving networks that the En has been ported and a new routing number is associated with the ported ETNS number.

Figure 7 shows the interaction (dotted lines) between the ETNS routing/portability database and the ETNS translation databases. Bearing in mind the ETNS reference model, the interactions described in figure 7 are the interactions corresponding to the E interface.

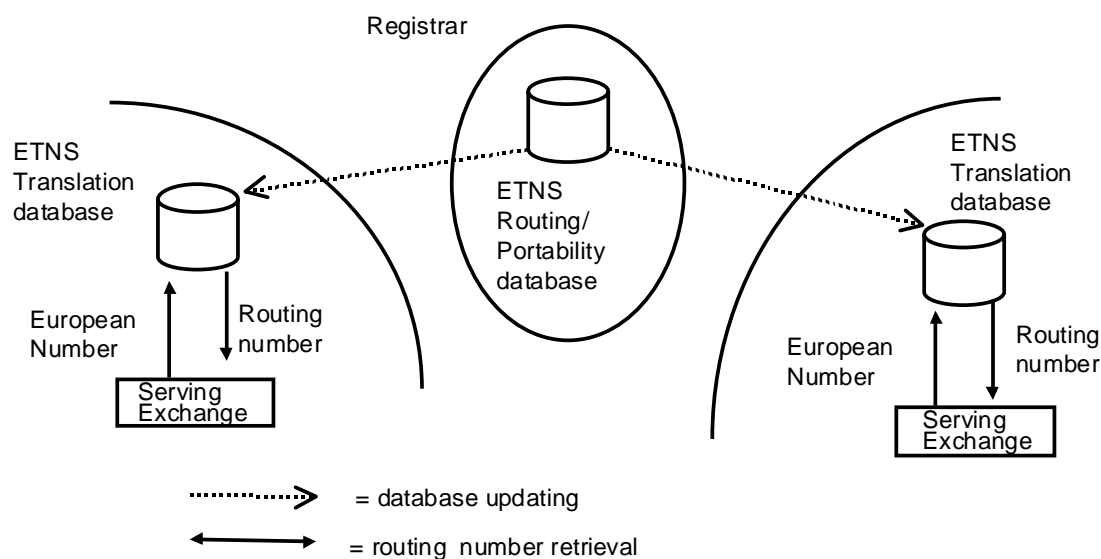


Figure 7: Interaction between registrar and ETNS translation database

In particular, the ETNS routing/portability database updates the ETNS translation databases that are the databases containing the association between the En and the routing number. The updating of the ETNS translation databases by the ETNS routing/portability database consists of communicating the new association between the ported En and the "new" routing number. It is worth noting that the ETNS routing/portability database does not need to directly access the ETNS translation databases to communicate the new association between En and routing number. More simply, the new association is communicated to serving networks which should subsequently update their own ETNS translation databases in a consistent way. In other words, it not necessary to define a direct communication between the ETNS routing/portability database and the ETNS translation databases.

It is important to note that the ETNS routing/portability database is not interrogated on a per call basis by the serving network. In fact the ETNS translation database contains a copy of the ETNS routing/portability database for the data relevant from the numbering and routing point of view. Every time data relevant to an ETNS number are changed, the ETNS routing/portability database is responsible for updating the appropriate ETNS translation databases. In this way only the ETNS translation database is asked on a per call basis by the serving exchange to get the routing number associated with the En.

12 Technical solutions for the communication between the ETNS translation database and the ETNS routing/portability database

The communication between the ETNS routing/portability database and the ETNS translation database (E interface) can be based on the use of manual procedures (e.g. fax, e-mail, etc.) in the initial phase. In a later phase, the use of automatic updating capabilities without human involvement should be investigated. In the long term, we can investigate the updating of the ETNS translation database via the use of IN Capability Set 2. The availability and, above all, the suitability of IN CS2 to support the communication between the ETNS routing/portability database and the ETNS translation database must still be proven.

History

Document history		
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