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*European Standard (Telecommunications series)*

**Routeing of calls to European Telephony  
Numbering Space (ETNS) services**

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*European Telecommunications Standards Institute*

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## Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Network Aspects (NA), and is now submitted for the Public Enquiry of the ETSI standards Two-step Approval Procedure.

<b>Proposed national transposition dates</b>	
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

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# 1 Scope

The present document specifies the routing methods that shall be used for implementation of the European Telephony Numbering Space (ETNS), the alternative structures of the routing numbers, the addressing between networks and how routing of calls within Europe, to and from Europe and through Europe shall take place.

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# 2 References

References may be made to:

- a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or
- b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or
- c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or
- d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as a EN with the same number.

## 2.1 Normative references

- [1] EN 301 161 (V1.1): "Management of the European Telephony Numbering Space (ETNS)".
- [2] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

## 2.2 Informative references

- [3] TR 101 074 (V1.1): "European Numbering Task Force; Management of the European Telephony Numbering Space (ETNS)".
- [4] TR 101 073 (V1.1): "Number portability for pan-European services".
- [5] TR 101 079 (V1.1): "Network Aspects (NA); Routing of calls to pan-European services using European Telephony Numbering Space (ETNS)".
- [6] ES 201 104 (V1.1): "Human Factors (HF); Human factors requirements for a European Telephony Numbering Space (ETNS)".
- [7] ETO Report: "Management, Routing and Portability aspects of the European Telephony Numbering Space (ETNS)".

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# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

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

**administrator:** The administrator has the responsibility for the high level management of the ETNS.

**assisted network:** A network which routes a call to an European number towards a serving network it has agreement with in order to complete the call.

**called party:** An entity that terminates a call to an European number. The called party may be the ETNS subscriber to the European number, an entity delegated by the ETNS subscriber, or a terminating equipment of the service network (e.g. a recorded announcement equipment).

**calling party:** An entity that dials an European number.

**ETNS country:** A CEPT member country participating in the ETNS.

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

**ETNS routeing number:** An ITU-T E.164 [2] number used to route to the service exchange. It can also identify the called party, the ETNS service provider, and / or the originating network for routeing purposes.

**ETNS service provider:** An entity that provides one or more ETNS service(s) to its ETNS subscribers on a contractual basis.

**ETNS service:** A service that has been assigned an ESI.

**ETNS subscriber:** An entity that requests a European number from a ETNS service provider in order to offer access from a calling party to a ETNS service.

**ETNS translation database:** A database which, in the call process, translates the European number into a routeing number.

**ETNS:** The numbering resource identified by E.164 [2] country code 388, used for the provisioning of the ETNS services.

**European number:** A number out of the ETNS.

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

**registrar:** The registrar is responsible for the day-to-day management of the ESN's behind each ESI.

**service exchange:** An exchange of the service network that triggers the provision of the service on reception of the routeing number, and then forwards the call.

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









**serving exchange:** An exchange, in the serving network, that can interrogate directly or indirectly an ETNS translation database to obtain a routeing number related to the European number, and then forward the call.

**serving network:** A network, with one or more serving exchanges.

**terminating number:** A number containing explicit information on the terminating point of the called party. The number is used to route towards the called party. It can be a routeing number, a European number or a geographical number.

## 3.2 Symbols

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

	Calling party
	Called party
	Originating, transit or destination exchange
	Serving exchange
	Service exchange
	ETNS translation database
	ETNS service provider database
	Combined serving and service exchange

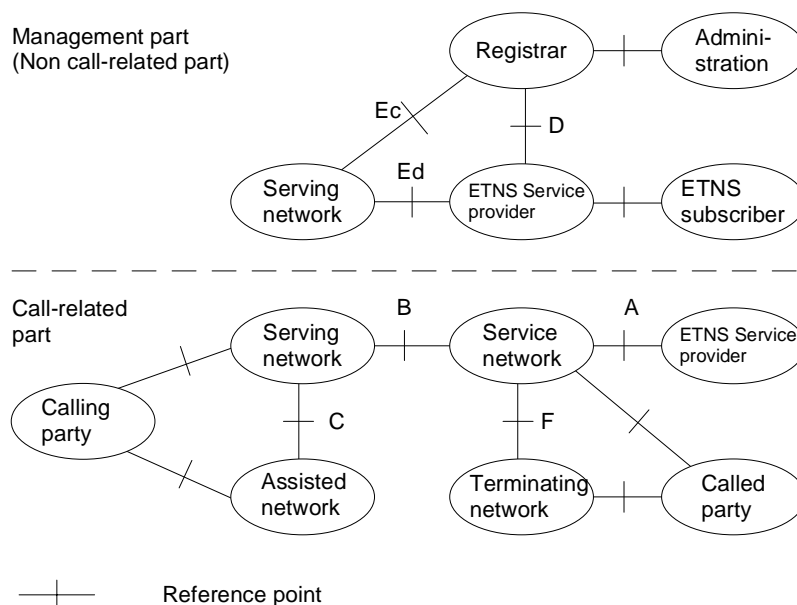
### 3.3 Abbreviations

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

CC	E.164 [2] Country Code
En	European number
ESI	European Service Identity
ESP	European Service Provider
ETNS	European Telephony Numbering Space
IN	Intelligent Network
INAP	Intelligent Network Application Protocol
ISUP	ISDN User Part
R	Registrar
Rn	Routeing number
RNIC	Routeing Number Identification Code
SD	Subsequent Digits
SgN	Serving Network
SNIC	Service Network Identification Code
SNPIC	Service Network/Provider Identification Code
SP	Service Provider
Tn	Terminating number

## 4 Reference model for the ETNS

This subclause provides a conceptual description of the implementation of the European Telephony Numbering Space (ETNS). Figure 1 shows the actors involved in the ETNS, and their relationship with each other. Also shown in figure 1 are the relevant reference points for the ETNS that are described in subclauses 4.1 and 4.2. Figure 1 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.



**Figure 1: Actors and reference points**

The reference points in the call-related part of figure 1 are used in the present document, while the reference points in the non call-related part are used in EN 301 161 [1].

The ETNS Service Provider (SP) is the entity that is relevant in the process of number assignment. The service network is the entity that is relevant in call processing. The ETNS SP and the service network may be a single entity or not; in the latter, the entity that assumes the function of ETNS SP 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 SP; the function of the second is to operate the call, this is the role of the service network.

The Serving Network (SgN) is responsible for routing a call from the calling party to the service network. The service network participates through the service exchange in the provision of ETNS services.

European numbers are managed by an independent authority, identified as the registrar and administration in figure 1.

## 4.1 Call-related part

This subclause describes the principles for routing a call from the calling party to the called party. A call to a En can be divided in two parts.

### 4.1.1 First leg: getting the ETNS Routing number (Rn)

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.

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

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

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

### 4.1.2 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 SP and the service network on the other side.

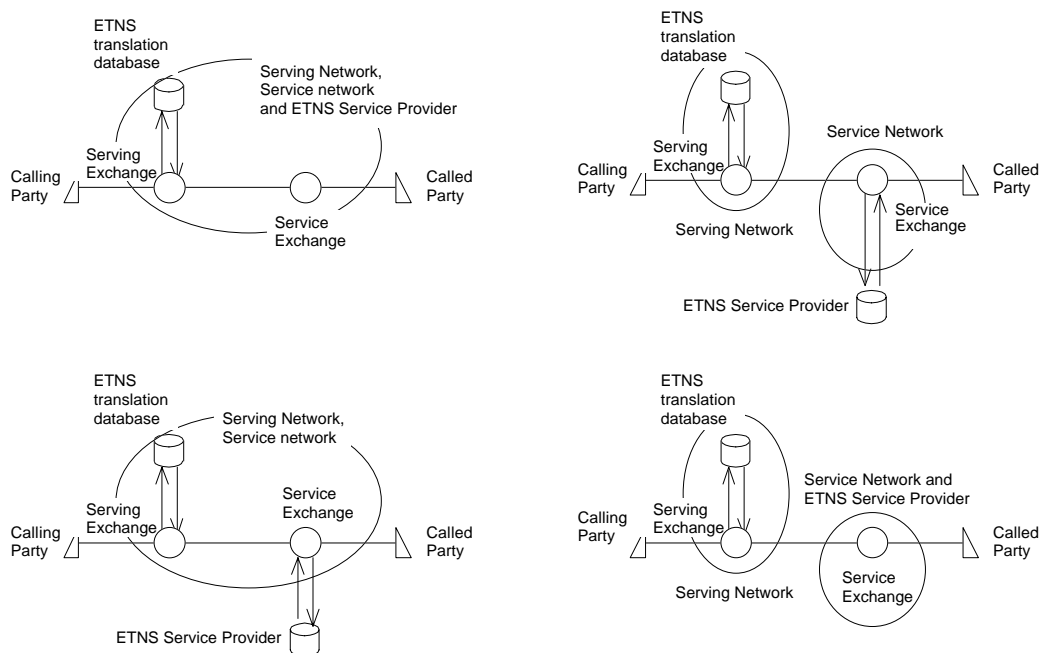
The nature of the service will determine the path of the call, whether it terminates to the subscriber, to a recorded announcement, or whether it needs a second number translation, etc.

The relationship between the ETNS SP 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 SP 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 SP depends on the service, technical constraints and the requirements from the regulatory environment.

### 4.1.3 Service provision by the Serving Network (SgN)

When the SgN and the service network are the same, the serving and service exchange within the network can be the same, and reference point B in figure 1 will then be internal. Figure 2 shows 4 examples of how service provisioning can take place. The calling and called party does not need to be connected to the serving and service networks respectively, as shown in figure 2.





**Figure 2: Examples of service provisioning**

## 4.2 Management part (non call-related)

Two functions are performed by the registrar. The first is the number assignment process. The second is the distribution, to the SgN, or the SP, of the Routing numbers bound to European numbers.

### 4.2.1 European number assignment

The ETNS registrar database is primarily used in the interaction between the registrar and the SPs for number assignment. The procedures are outlined in the ETNS Numbering Conventions [7].

### 4.2.2 ETNS Routing numbers updating

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 SP has occurred, that may entail new ETNS Routing numbers.

The procedure for the distribution of the ETNS Rns to the SgNs can take place in two ways, centralized or decentralized. In either case, it is assumed that the SP has obtained the ETNS Rns from the SgNs it has agreement with. Figure 3 illustrates the alternatives for information transfer between the involved parties when updating the ETNS translation databases.

**Centralized:** The SP informs the R of the ETNS Routing numbers and its connected European numbers. The registrar distributes ETNS Routing numbers and their connected European numbers to the SgNs (see reference point Ec in figure 1).

**Decentralized:** The service provider informs the SgNs of the ETNS Rn(s) and its connected En(s) (see reference point D and Ed in figure 1). Routing numbers will be assigned and recorded in order to audit the numbers for improper use.

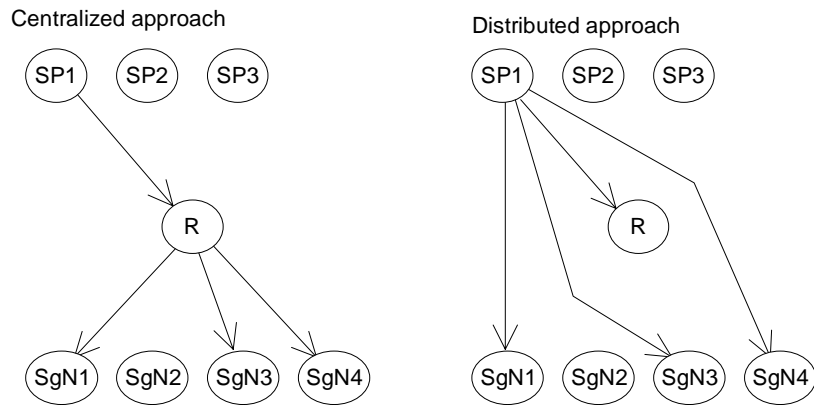


Figure 3: Alternatives for the updating of ETNS translation databases

## 5 Routing

The present document describes the requirements to enable the routing of European numbers i.e. the routing method, the structure of the ETNS Routing numbers, the addressing between networks and the routing of calls within Europe, to and from Europe and transiting through Europe.

### 5.1 Routing methods

Single or double translation shall be used for the routing of calls between the calling and called party. Use of single or double translation is service dependent.

The serving exchange, ETNS translation database, the service exchange and the ETNS SP database shall all be located in Europe to participate in the provisioning of ETNS services.

#### 5.1.1 Single translation

Single translation is a routing method that utilizes one number translation during the call setup between the calling and called party. All routing decisions shall be based upon the called En and the Terminating number (Tn) as shown in figure 4.

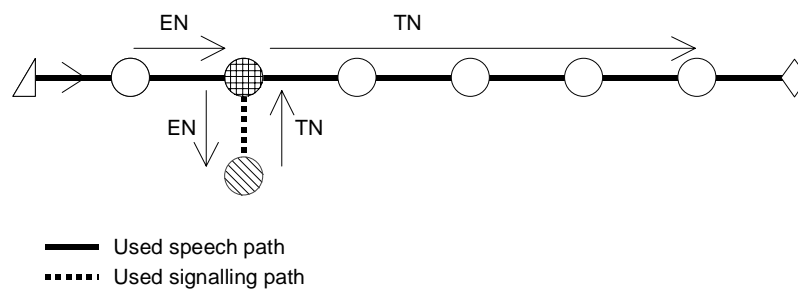


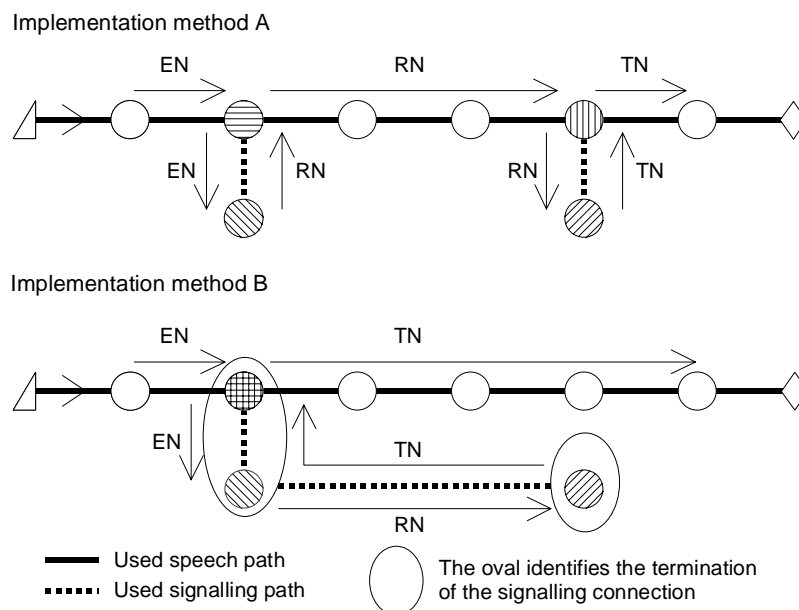
Figure 4: Single translation

#### 5.1.2 Double translation

Double translation can be implemented in two ways:

- utilizing the speech and signalling path between the Serving exchange and the ETNS service provider database;
- utilizing the signalling path between the serving/service exchange and the ETNS service provider database; as illustrated in figure 5.

Each routing decision is based upon the analysing of minimum one of the following three addressing parameters: the dialled En, an ETNS Rn or the Tn. All of these numbers shall be E.164 numbers [2] if they cross a boundary between two networks.



**Figure 5: Double translation**

Implementation method A with non-standardized interfaces requires that the serving exchange and the ETNS translation database be co-located within one network operator, and that the service exchange and the ETNS SP database also be co-located within one network, which can either be the same as for the serving exchange/ETNS translation database or another.

Implementation method B with standardized signalling interfaces between the databases, and standardized translation between the Intelligent Network (IN)-signalling and ISDN User Part (ISUP) version 2, separates the service exchange and the ETNS SP database. The combined serving/service exchange and the ETNS translation database are normally co-located within one network. The oval illustrates that the exact termination of the signalling connection within the IN-architecture is not decided.

Non-standardized interfaces can by bilateral agreements be used between networks.

## 5.2 Structure of ETNS Routeing numbers

The ETNS Routeing numbers shall identify the service network and the SPs connected to these networks.

The creation of a Rn series for ETNS is a national matter. Each service network shall be assigned a Rn dedicated to this purpose. These ETNS Routeing numbers are additional demand caused by ETNS operations.

The Routeing numbers shall be a number from behind a Country Code (CC) allocated to one of the ETNS countries, and its structure is a national matter.

Change of service network means change of ETNS Rn, while change of ETNS SP within one service network should not necessarily mean a change of Rn.

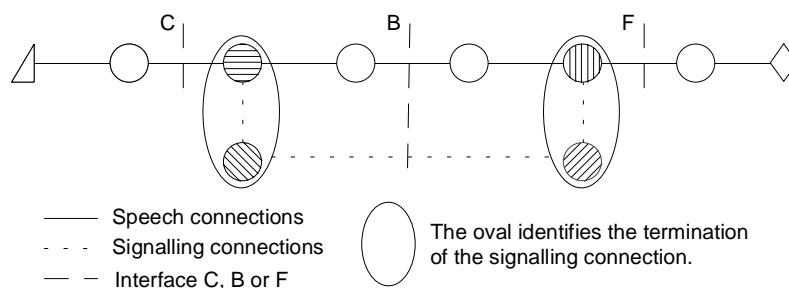
## 5.3 Addressing between networks

Both of the implementation options identified for double translation in subclause 5.1.2 utilize Routing numbers to locate the ETNS SP database. The addressing can take place in two ways, determined by what the Routing numbers identify and how they are transferred between the ETNS translation database and the ETNS SP database. The two addressing methods can thus be described as:

- 1) ETNS Rn identifying the called party (Rn1);
- 2) ETNS Rn identifying ETNS service providers (Rn2).

To understand the differences between single and double translation and the two addressing methods for double translation, we need to look at the addresses at the reference points identified in the call-related part of figure 1. Figure 6 shows 4 interfaces between a calling and called party at which the transferred addresses will be identified. These interfaces are:

- C) In front of the Serving exchange;
- B) Between the serving and service exchange and between the signalling termination points;
- F) After the service exchange.



**Figure 6: Interfaces where addresses are identified**

Table 1 shows the addresses for single and double translation addressing methods 1 and 2, transferred in the call setup direction, at the three mentioned interfaces. For double translation addressing the differences between addressing methods 1 and 2 are identified.

**Table 1: Addresses for single and double translation**

Routeing method	Interface C	Interface B	Interface F
Single translation	En (see note)	Tn	Tn
Double translation			
Addressing method 1	En (see note)	Rn1	Tn
Addressing method 2	En (see note)	Implementation method A: Rn2 and En Implementation method B: Rn2 and En towards the ESP database, and Tn from it	Tn
NOTE: The international prefix is not part of the En.			

One En can be translated into different Routing numbers depending upon the origin of the call, if the termination of the call depends upon where it is originated.

One ETNS SP can have more than one identity (Rn2), for different purposes.

With addressing method 2 it is required that both Rn2 and En be transferred across interface B.

Addressing method 2 should be used as soon as the capability for this is available.

Normally direct calls to Routing numbers shall be barred.

## 5.4 Routeing of calls

Calls to ETNS may originate and terminate within or outside Europe, but the serving exchange, ETNS translation database, the service exchange and the ETNS service provider database shall all be, as stated in subclause 5.1, located in Europe.

### 5.4.1 Within Europe

This covers calls that originate and terminate in Europe.

A subscriber shall have the right to determine the area from where calls can be received as long as there is a minimum of two European countries. All other European numbers should be accessible from all Europe. All Routeing numbers and Terminating numbers shall be numbers taken from European national numbering resource.

There may, for a period of time, within Europe exist specific geographical areas which have no translation capability at all. This shall not influence on the possibility for the users within that area to dial a En. All networks without translation capability are per definition assisted networks, and all assisted networks within Europe shall route the European numbers to a SgN that they have an agreement with.

### 5.4.2 To Europe

This covers calls that originate outside Europe and terminate in Europe. The call originating networks, that are all non-European networks, are assisted networks. All Routeing numbers and Terminating numbers are numbers taken from European national numbering resource.

A subscriber shall have the right to determine the area from where calls can be received as long as there is a minimum of two European countries.

If an assisted network in Europe receives an incoming call from a non - European country to a En, the assisted network shall route the call to a SgN that they have an agreement with.

### 5.4.3 From Europe

This covers calls that originate in Europe and terminate in a non-European country. All Routeing number shall be numbers taken from European national numbering resource, and the Terminating numbers are non European numbers.

A subscriber shall have the right to determine the area from where calls can be received as long as there is a minimum of two European countries. All other European numbers should be accessible from all Europe.

There may, for a period of time, within Europe exist specific geographical areas which have no translation capability at all. This shall not influence on the possibility for the users within that area to dial a En. Assisted networks within Europe shall route the European numbers to a SgN that they have agreement with.

### 5.4.4 Transiting through Europe

This covers calls that originate and terminate in a non - European country, and are handled by serving exchanges, ETNS translation databases, service exchanges and ETNS SP database located in Europe. All Routeing numbers shall be numbers taken from European national numbering resource, and the Terminating numbersNs are non European numbers.

If an assisted network in Europe receives an incoming call from a non-European country to an En, the assisted network shall route the call to a serving network that they have an agreement with.

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## Annex A (informative): Routeing of calls to Corporate Networks (CN)

### A.1 Routeing of calls to Corporate Networks (CN)

If an ESI is allocated to enable routeing of calls to corporate networks, then the following examples details how this could be implemented.

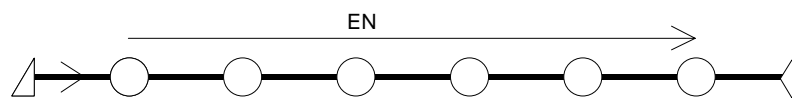
Routeing of calls to corporate networks can take place in three ways: either through direct routeing or with single or double translation.

#### A.1.1 Direct routeing

Direct routeing may be utilized when the corporate network identity is recognized within the first 7 digits [2] of the En.

Direct routeing shall not utilize number translation in the public networks.

By direct routeing each exchange involved in call setup shall base the routeing decision on the analysis of the En only. Direct routeing can schematically be illustrated as shown in figure A.1.



**Figure A.1: Direct routeing**

#### A.1.2 Single and double translation

Single translation is described in subclause 5.1.1, and double translation is described in subclause 5.1.2.

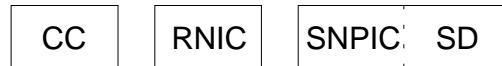
Single or double translation should be utilized when the corporate network identity cannot be recognized within the first 7 digits [2] of the En.

## Annex B (informative): Structures of the ETNS Routeing numbers

### B.1 Structures of the ETNS Routeing numbers

Figure B.1 illustrates two options for the structure of ETNS Routeing numbers.

a) National specific RNs



b) Network specific RNs



CC: E.164 Country Code  
 SNPIC: Service Network/Provider Identification Code  
 RNIC: Routeing Number Identification Code  
 SD: Subsequent Digits to complete the call  
 SNIC: Service Network Identification Code

**Figure B.1: Structures of routeing numbers**

The SNPIC identifies the SgN and/or the SP. With the network specific Routeing numbers (figure 2b) the RNIC identifies the SPs.

All international Routeing numbers shall be less than 15 digits, and the routeing and charging parameters shall be identified within the first 7 digits of the international Rn [2].

For some services or specific purposes the ETNS Routeing numbers do not need to be structured like figure B.1.

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## History

<b>Document history</b>				
V1.1.1	March 1998	Public Enquiry	PE 9829:	1998-03-20 to 1998-07-17