ECMA

EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

STANDARD ECMA-155

ADDRESSING IN PRIVATE TELECOMMUNICATION NETWORKS

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Brief History

This ECMA Standard is one of a series of standards which are applicable to private telecommunication networks. Its purpose is to serve as a general and common reference for all addressing-related statements in other standards on private telecommunication networks.

This Standard is based on the ISDN concept as developed by CCITT and refined by ETSI for European applications, but modified to cover the particularities of private telecommunication networks. It is also in the framework of standards for Open Systems Interconnection as defined by ISO 7498.

This Standard is based on the practical experience of ECMA Member Companies and the result of their active and continuous participation in the work of ISO, CCITT and various regional and national standardization bodies in Europe and the USA. It represents a pragmatic and widely based consensus.

This Standard enables the Authority of a Private Telecommunication Network (PTN) to choose whether

- the ISDN Numbering Plan according to CCITT Rec. E.164, or

- a Private Numbering Plan, or

- an Implicit Numbering Plan, or

- any combination of these numbering plans

shall be employed as native numbering plan(s) in its PTN (PTN NP).

In addition, the Authority can employ PTN subaddressing in order to expand the addressing capacity beyond the capacity of the PTN NP.

The impact of this on terminal interchangeability between accesses of public and private ISDNs is indicated in annex D.

This Standard is contributed to the ETSI, European Telecommunication Standardization Institute, for adoption as a European Telecommunication Standard (ETS), in accordance with the ITSTC Programme of Work for Private Telecommunication Network Standardization (M-IT-05, 1989, item 3.3.3.1).

Adopted as an ECMA Standard by the General Assembly of ECMA of June 1991.

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1   SCOPE

This Standard defines the requirements for the handling of network addresses for the identification of entities which use telecommunication services offered by Private Telecommunication Networks (PTNs). The Standard covers numbering, including the requirements for the support of a Private Numbering Plan, and the support of subaddressing.

This Standard is applicable to Private Telecommunication Network Exchanges (PTNX) and to terminals to be attached to the access of PTNXs. Any use by a PTNX of the Support of Private Numbering Plans supplementary service provided by a public ISDN is outside the scope of this Standard.

2   CONFORMANCE

In order to conform to this Standard, a PTNX shall meet the mandatory requirements of clauses 5 to 7 and 9.

In order to conform to this Standard, a terminal for attachment to an access of a PTNX shall meet the mandatory requirements of clauses 8 and 10.

3   REFERENCES

ECMA-133	Reference Configurations for Calls through Exchanges of Private Telecommunication Network Exchanges (1989)
ISO 8348 AD2	Information processing systems - Data communications - Network service definition. Addendum 2: Network layer addressing (1988)
CCITT Rec. I.334	Principles relating ISDN Numbers/Addresses to the OSI Reference Model Network layer Addresses (Blue Book, 1988)
CCITT Rec. E.160	Definitions relating to National and International Numbering Plans (Blue Book, 1988)
CCITT Rec. E.164	Numbering Plan for the ISDN Era (Blue Book, 1988)
ETS 300 062	Integrated Services Digital Network (ISDN) - Direct Dialling in (DDI) Supplementary Service - Service Description

4   DEFINITIONS

For the purpose of this Standard the definitions in ISO 8348 AD2 and in CCITT Rec. E.160 shall apply. In case of conflict the definition in ISO 8348 AD2 shall take precedence. In addition the following definitions apply.

4.1   Address

Formalized information used to indicate unambiguously an identifiable entity. Within the context of this Standard, identifiable entities are those which use telecommunication services.

4.1.1   Number

An address restricted to containing numerical values, as defined by a numbering plan.

4.1.1.1   PTN Number

A number of the domain covered by a PTN Numbering Plan.

4.1.1.2 Partial Number

The subset of a number which is at least significant at a particular access of the network concerned for distinguishing addressable entities beyond that access.

4.1.2 Subaddress

A part of an address beyond the addressing capability of a numbering plan.

4.2 Domain

The range of responsibility of an Authority for setting up numbering and/or addressing plans. The boundaries of a domain need not coincide with the physical boundaries of a given network.

4.2.1 Sub-Domain

A part of a domain where the responsibility for administering numbering and/or addressing plans is delegated to a subordinate authority.

4.3 Numbering Plan

4.3.1 Explicit Numbering Plan

A numbering plan in which each number is accompanied by an indication to which (sub)-domain it applies.

4.3.2 Implicit Numbering Plan

A numbering plan in which each number is not accompanied by an indication to which (sub)-domain it applies. Instead the identification has to be determined from the number digits themselves.

NOTE 1

The relationship between a Dialling Plan and an Implicit Numbering Plan is explained in annex E.

4.3.2.1 Prefix

A (set of) defined leading digit(s) indicating within the context of an implicit numbering plan the (sub)-domain in which the subsequent digits form a significant number.

4.3.3 Native Numbering Plan

A numbering plan employed by a given domain in a way that it unambiguously identifies the addressable entities of that domain.

4.3.4 Foreign Numbering Plan

A numbering plan not native to a given domain, however, supported by it in so far as that it is known to the given domain.

4.3.5 Private Telecommunication Network Numbering Plans (PTN NP)

The generic designation for the numbering plan(s) chosen as native by a PTN Authority for its particular PTN.

4.3.5.1 ISDN Numbering Plan (ISDN NP)

The numbering plan explicitly relating to the global ISDN domain, as defined in CCITT Rec. E.164.

4.3.5.2 Private Numbering Plan (PNP)

The numbering plan explicitly relating to a particular private numbering domain, defined by the Authority of that domain.

4.3.5.2.1 PNP Number

A number belonging to a PNP.

4.3.5.2.2 Region

The entire domain or a defined sub-domain of a PNP.

NOTE 2

A region does not necessarily correspond to a geographical area of a PTN.

4.3.5.2.3 Region Code (RC)

An RC comprises those leading digits of a PNP Number which identify a region.

NOTE 3

The RC may be omitted to yield a shortened form of a PNP Number for use internally to that region.

4.3.5.2.4 Regional Number (RN)

A particular form of a PNP Number which is unambiguous in the region concerned.

4.3.5.2.5 Complete Number (CN)

A number which is unambiguous in the entire PTN, i.e. which corresponds to the highest level employed in that PTN.

4.3.5.3 Unknown Numbering Plan (Unknown NP)

The numbering plan reflecting a dialling plan which is implicitly based on a particular private numbering domain as defined by the Authority.

4.3.6 Dialling Plan

A plan according to which a user can identify addressable entities by means of numbers and, if applicable, of prefixes indicating the (sub)-domain to which the addressable entity belongs.

4.4 Numbering Plan Identifier (NPI)

An indication of the numbering plan to which a number belongs; it is separate from the number itself.

4.5. Type of Number (TON)

An indication which distinguishes the various complete and shortened forms of number; it is separate from the number itself.

4.6 Escape Code

A code defined by a given numbering plan to indicate that the number following is significant only in another, defined numbering plan.

4.7 Selection Address/Number

An address or a number used to select a user to which a call is to be established.

NOTE 4

This term also applies to addresses in general, i.e. also to subaddresses.

4.8 Identification Address/Number

An address or a number when used to present a user's identity to another user.

NOTE 5

This term also applies to addresses in general, i.e. also to subaddresses.

4.9   Multiple Subscriber Number (MSN)

A full or a partial number assigned to a user-to-network access for which an arrangement has been established in the context of the MSN supplementary service ("MSN arrangement").

5   LIST OF ACRONYMS

AFI	Addressing plan and Format Identifier
CN	Complete Number
DDI	Direct Dialling-In supplementary service
DSS1	Digital Subscriber Signalling system No. 1
ISDN	Integrated Services Digital Network
MSN	Multiple Subscriber Number supplementary service
NP	Numbering Plan
NPI	Numbering Plan Identifier
NSAP	Network Layer Service Access Point
OSI	Open Systems Interconnection
PNP	Private Numbering Plan
PSTN	Public Switched Telephony Network
PTN	Private Telecommunication Network
PTNX	Private Telecommunication Network Exchange
Q	Q reference point
RC	Regional Code
RN	Regional Number
S	S reference point
SA	Sub-Address
SPNP	Support of Private Numbering Plans supplementary service
T	T reference point
TON	Type of Number
TOS	Type of Subaddress

6   PTN ADDRESSABLE ENTITIES

Depending on the numbering plan(s) employed, a PTN shall be able to assign an appropriate PTN number to each of its addressable entities.

NOTE 6

An addressable entity can be associated with:

- *a single access of the PTN;*
- *several accesses of the PTN (e.g. a line hunting group);*
- *an internal entity of the PTN (e.g. a service provider)*

NOTE 7

A particular PTN number can fulfil only one of the functions.

A PTN may be able to assign more than one number to the same access of the PTN, in accordance with the Multiple Subscriber Number supplementary service.

The PTN number of a PTN numbering domain shall not be required to identify a particular channel of an interface comprising more than one channel. Indirect identification can, however,

occur, e.g. when a PTN number identifies one-to-one correspondence between the interface and a particular application with a one-to-one correspondence to a particular channel.

7   REQUIREMENTS ON NUMBERING PLANS, AND ON THEIR INTERRELATIONSHIPS

Private telecommunication networks shall employ numbering plans, i.e. the addresses used within their addressing domains shall be numbers.

Depending on the choice of the PTN Authority, the configuration management shall allow the employment of the following numbering plans as native PTN numbering plans:

- the ISDN numbering plan according to CCITT Rec. E.164, hereafter referred to as "ISDN NP"; or
- a Private Numbering Plan, hereafter referred to as "PNP"; or
- an implicit Numbering Plan; or
- any combination of these numbering plans.

NOTE 8

For further information on the use of these numbering plans, see annex B.

For the purpose of this Standard

- the addressing domain of a PTN shall be assumed to be the whole PTN. If a PTN is divided into two or more addressing domains, each with its own PTN NP, each addressing domain shall be considered to be a separate PTN;

- communication between one addressing domain and another addressing domain shall be treated as interworking between two PTNs;

- a single addressing domain spanning more than one PTN shall be considered as a single PTN.

7.1   Content of PTN Numbers

Number information can be presented in two formats, the explicit and the implicit format. In both formats the number digits shall be accompanied by a Type Of Number (TON) value, in accordance with Table 1.

Table 1: TON Values for the E.164, PNP and Unknown NP Indications

Explicit Format		Implicit Format
NPI = E.164	NPI = PNP	NPI = UNKNOWN
–	Level 3 Regional Number	
International Number	Level 2 Regional Number	
National Number	Level 1 Regional Number	
Subscriber Number	Local Number	
Partial *(Note 1)*	Partial *(Note 1)*	
Unknown *(Note 1)*	Unknown *(Note 1)*	Unknown *(Note 2)*
Network specific Number	PTN specific Number	
Abbreviated Number	Abbreviated Number	

Note 1:   *In the standards on the DSS1 of public and private ISDNs (ETS 300 102 and ECMA-106) the TON values "Unknown" and "Partial" share the same codepoints. Distinction is made by the direction of number information flow:*
At the boundary between the public ISDN and a PTNX the meaning for Selection Numbers is "Unknown" if the information flow is to the public ISDN, and the meaning is "Partial" if the the information flow is from the public ISDN (i.e. in the context of DDI). For Identification Numbers the meanings are reversed.
At the boundary between the private ISDN and its terminals the meaning for Selection Numbers is "Partial" if the information flow is from the private ISDN to the terminal (i.e. in the context of MSN), and the meaning is "Unknown" if the information flow is from the terminal to the PTNX. For Identification Numbers the meanings are reversed.

Note 2:   *The number digits follow an implicit numbering plan and can include prefixes.*

In the explicit format the numbering plan indicator (NPI) shall have a value other than "UNKNOWN". The TON shall be set to either "UNKNOWN" or to any of the other values specified for the NPI concerned. Except where the TON is set to "UNKNOWN", the number digits shall not include prefixes.

In the implicit format the NPI shall have the value "UNKNOWN". The TON shall only take the value "UNKNOWN". If applicable, the number digits shall include prefixes, according to the implicit numbering plan employed.

7.2 Content of the Number Digits in a PTN Numbering Plan

7.2.1 ISDN NP

The content of digits of the ISDN NP is outside the scope of this Standard. Information can be found in CCITT Rec. E.164.

7.2.2 PNP

A PNP Number shall comprise a sequence of x decimal digits (0,1,2,3,4,5,6,7,8,9) with the possibility that different PNP Numbers within the same PNP can have different values of x. The maximum value of x shall be the same as for the public ISDN numbering plan, see CCITT Rec. E.164.

NOTE 9

Within this range, the maximum value of x in a particular PTN can be determined by the PTN Authority.

NOTE 10

It is the PTN Authority's responsibility to choose the appropriate numbering capabilities of the PTNXs and terminals for that PTN.

With the value of TON = UNKNOWN any prefixes are additional to the value of x.

NOTE 11

The definition of prefixes (e.g. decimal digits and/or special or alpha characters like #, A, B, C...) is under the responsibility of the PTN Authority and is outside the scope of this Standard.

The minimum capabilities of a PTNX shall be such that for a level 0 regional number a value of 4 can be supported for x.

NOTE 12

Within this range, the actual value of x for a particular level 0 regional number can be determined by the PTN Authority.

7.2.3 Unknown NP

For a number of an Unknown NP the same value x for the number of digits shall apply as specified for the PNP, see 6.2.2. Any prefixes shall be additional to the value of x.

NOTE 13

The definition of prefixes (e.g. decimal digits and/or special or alpha characters like #, A, B, C...) is under the responsibility of the PTN Authority and is outside the scope of this Standard.

7.3 Structure of Private Numbering Plans

A PNP can be hierarchically organized by means of regions. Shortened forms of PNP Numbers can then be used in certain parts of a PTN.

NOTE 14

A region will typically comprise one or more PTNXs; but in principle there is nothing to prevent a numbering boundary from occurring inside a PTNX.

Different levels of region are made possible by employing the regioning principle in a recursive manner. Therefore, within a region of level n, one or more regions of level n-1 may exist. The highest level of a region is the entire PNP. A PNP Number which has significance within a level n region shall be called a level n regional number. The lowest level of a region shall be called level 0. The maximum level number in a PTN shall be three.

NOTE 15

In a PNP without hierarchical structure, the level of the only region is 0.

The TON indicator shall indicate the level of region to which a PNP Number belongs. Where the TON indicator has the value "UNKNOWN", the level to which a PNP Number belongs shall be clear from the digits of the number, e.g. by the use of prefixes or implied by the leading digits.

A level 0 shall be called a local number (LN). An RN for the highest level which exists within a PNP shall be called a Complete Number (CN).

A level n RN with n greater than 0 shall comprise a level n-1 RN and a level n-1 region code (RC) identifying the level n-1 region to which the level n-1 RN belongs. The level n-1 RC shall occupy the leading digits of the level n RN, and the level n-1 RN shall occupy the trailing digits. This is illustrated in figure 1.
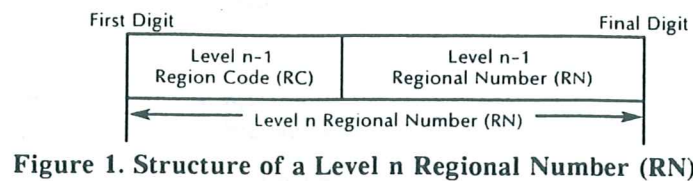
Figure 1. Structure of a Level n Regional Number (RN)
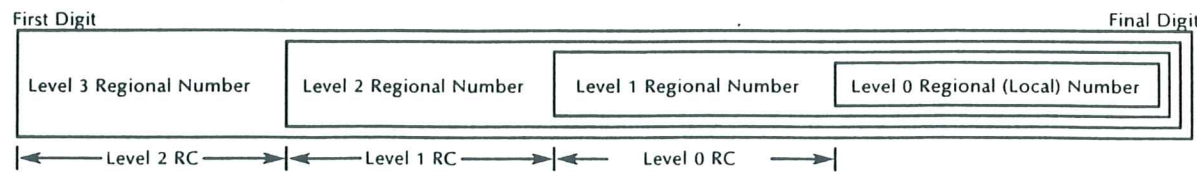
A full 4 level structure is shown in figure 2.

Figure 2. Structure of a PNP Number with Four Levels of Regions

A level n RN shall have significance only within the level n region to which it applies. When that number is used outside that level n region, it shall be in the form of an RN of level greater than n. Only a CN shall have significance throughout the entire PNP.

It shall not be necessary for all level n-1 RCs in a level n region to have the same number of digits. It shall be possible for the number of digits in a level n-1 RC to be 0.

It shall not be necessary for all level n-1 RNs within a level n region to have the same number of digits.

7.4   Relationship between the Private and the ISDN Numbering Plan

If a PNP is employed in a given PTN, any addressable PTN entity shall be able to be identified by more than one number, viz. a number of the PNP and a number of the ISDN Numbering Plan. If applicable, the PTN shall be responsible for converting between the PNP and the ISDN Numbering Plan.

NOTE 16

For the membership of addressable PTN entities of NPs other than the PNP or the ISDN Numbering Plan see 7.6.

NOTE 17

A simple relationship between PNP Numbers and ISDN Numbers, e.g. conformity of the significant (e.g. the last few) digits of the PNP Number and a partial ISDN Number, will

- *facilitate interworking of the two numbering plans,*
- *provide better visibility to users, and*
- *simplify directories.*

NOTE 18

The case where a PTN user has a PNP Number but no ISDN Number does not prevent him from communicating with users of public ISDNs. Outgoing calls from the user to a public ISDN are possible, although no identification of the originating user (other than a possible subaddress) can be given to the public ISDN. Incoming calls can only be established indirectly via another PTN user (e.g. a PTN directory service or attendant).

7.5   Relationship between PNP Numbers in Different PTNs

When two PTNs are directly connected in a way that communication can be established between a user of one PTN and a user of the other PTN without involving a public network, any user in one PTN who needs to receive calls directly from the other PTN shall have a PNP Number from the other PTN's PNP, in addition to a PNP Number of his own PTN's PNP.

NOTE 19

A PNP Number of one PTN's PNP has no significance in the other Network's PNP.

For Selection Numbers, each PTN shall be responsible for ensuring that the only PNP Numbers sent to the other PTN are numbers of the other PTN's PNP.

NOTE 20

Similar responsibility should apply to Identification Numbers. If this is not possible, they should preferably be suppressed. Otherwise, if they were sent unchanged to the other PTN, they might not be adequate for identification purposes.

7.6   Relationship with Numbering Plans other than the PTN NP or ISDN NP

A PTN can recognize the International Numbering Plan for public Data Networks according to CCITT Rec. X.121 and the Plan for Telex Destination Codes according to CCITT Rec. F.69, as described below. Interworking with other numbering plans, e.g. with National Standard NPs or the ISO Addressing Plans ICD and DCC, is outside the scope of this Standard.

7.6.1   Explicit Interworking

Explicit Interworking with other numbering domains occurs when the number information of an addressable entity explicitly contains a numbering plan indication, which is neither the PNP nor the ISDN NP.

NOTE 21

Explicit interworking from CCITT Rec. E.164 NP to CCITT Rec. X.121 NP (and vice versa) can alternatively be achieved by using an escape code, see CCITT Rec. E.166 and Rec. X.122.

If the PTN is able to recognize a particular foreign NP, it shall, by processing Selection Numbers, be able to route the path, by virtue of the mere numbering plan indication, to a gateway function which leads to the corresponding foreign numbering domain.

If a PTN is not able to recognize a particular foreign numbering plan, it shall orderly reject the addressing request.

NOTE 22

The gateway can be a direct or indirect one, depending on whether the foreign numbering domain attaches to the PTN immediately or via an intermediate domain as, for example, the public ISDN. The definition of the routeing data is subject to PTN management control and is outside the scope of this Standard.

NOTE 23

Explicit interworking can embed further interworking, e.g. a number of the X.121 NP can include an escape code leading back to the ISDN NP (see CCITT Rec. X.122).

When a PTN receives an Identification Number of a foreign numbering domain it shall not alter it.

When transmitting its native Identification Numbers, the PTN shall present them according to the ISDN NP. If this is not possible, the PTN shall indicate to the foreign numbering domain that an Identification Number is not available, due to interworking reasons.

7.6.2 Implicit Interworking

Implicit interworking with other numbering domains occurs when

- the PTN concerned adheres to the implicit numbering concept, and
- the number information of the addressable entity contains prefixes which lead to a foreign numbering domain.

When processing Selection Numbers, the PTN shall be able to route the path, by virtue of the prefixes, to a gateway function which leads to the corresponding foreign numbering domain.

NOTE 24

The gateway can be a direct or indirect one, depending on whether the foreign numbering domain attaches to the PTN immediately or via an intermediate domain as, for example, the public ISDN. The definition of the routeing data is subject to PTN management control and is outside the scope of this Standard.

When receiving Identification Numbers of a foreign numbering domain the PTN can be required to alter them, e.g. by adding a prefix.

When transmitting its native Identification Numbers, the PTN can be required to alter them, e.g. by adding a prefix.

If a PTN is not able to support a particular foreign numbering plan, it shall orderly reject the addressing request.

8 NUMBER HANDLING REQUIREMENTS OF PRIVATE TELECOMMUNICATION NETWORK EXCHANGES

This clause specifies the numbering formats of Selection and Identification Numbers which a PTNX shall be able to accept and to provide at the following interfaces:

- PTN access interfaces at the S reference point;
- public ISDN access interfaces at the T reference point;
- inter-PTNX connections at the Q reference point.

The reference points are defined in ECMA-133.

Figure 3 indicates the numbering plan identifications to be accepted and provided for Selection Numbers.
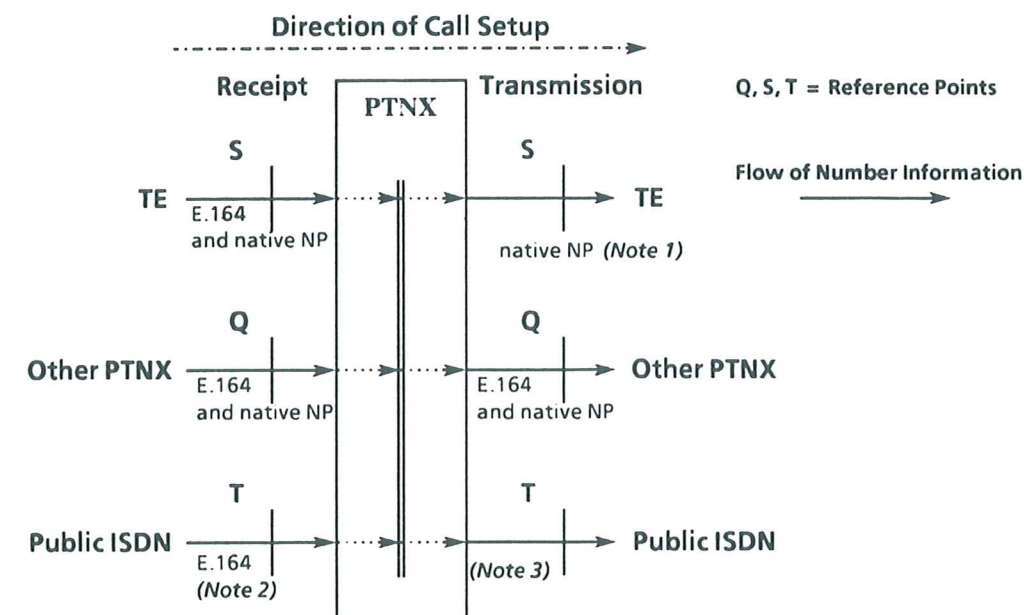
Note 1: In the case of an MSN arrangement only, see normative Annex C.
Note 2: In the case of the DDI supplementary service only.
Note 3: Specified in Standards for the Public ISDN.

Figure 3: Numbering Formats for Selection Numbers

Figures 4 and 5 indicate the numbering plan identifications to be accepted and provided for Origination and Destination Identification Numbers, respectively.

NOTE 25

The term "native NP" indicates that, according to the choice of the PTN Authority, any of the NPI values can occur, see clause 6. The indication "E.164 and native NP" means that the ISDN Numbering Plan will occur in any case, irrespective of whether E.164 has been chosen as a native NP.
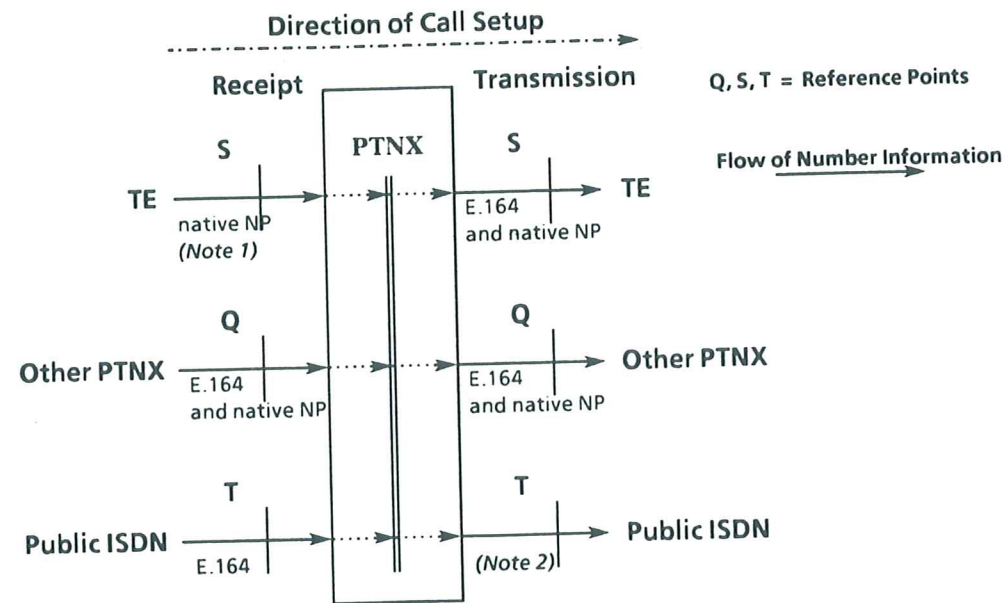
Direction of Call Setup →
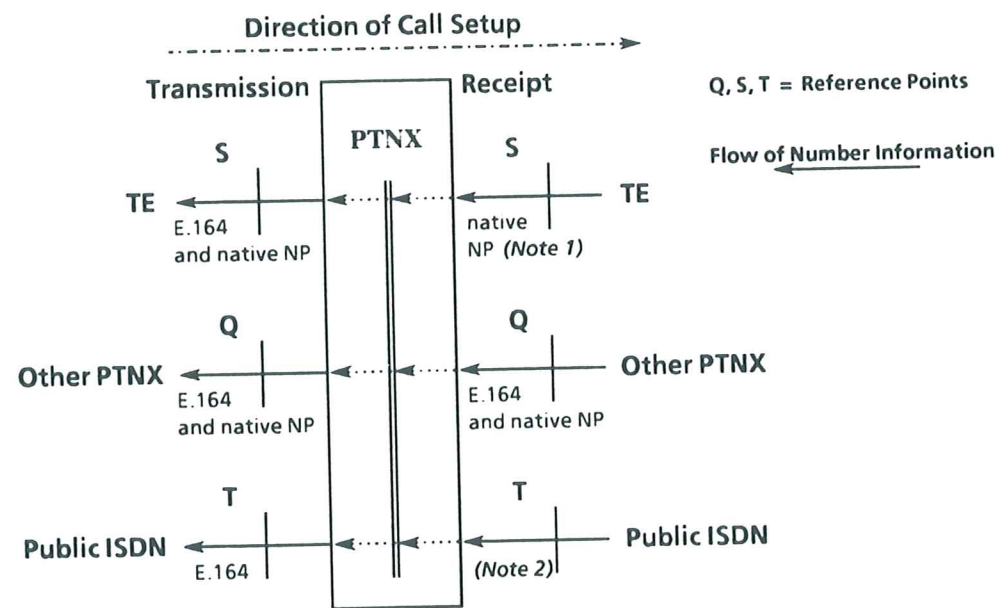
Receipt | Transmission | Q, S, T = Reference Points

Flow of Number Information →

Note 1: In the case of an MSN arrangement only, see normative Annex C.
Note 2: Specified in Standards for the Public ISDN.

Figure 4: Numbering Formats for Originating Identification Numbers

Direction of Call Setup →

Transmission | Receipt | Q, S, T = Reference Points

Flow of Number Information ←

Note 1: In the case of the MSN supplementary service only, see normative Annex C.
Note 2: Specified in Standards for the Public ISDN.

Figure 5: Explicit Numbering Formats for Destination Identification Numbers

8.1 PTNX Requirements for the Acceptance of Received Numbers

This clause specifies the forms of numbers a PTNX shall be able to accept as Selection Numbers during call establishment, and as Identification Numbers in connection with supplementary services.

A PTNX shall interpret a received PNP Number with a region level less than the highest level used in that numbering plan (i.e. not a CN), as relating to the region of that level to which the PTNX belongs.

If a PTNX receives a PNP number and the domain does not employ a PNP, the received number shall be treated as invalid.

If a PTNX receives an implicit number and the domain does not employ an implicit PNP, the received number shall be treated as invalid.

If a PTNX receives a PNP number with a TON value which has no meaning within the domain concerned (e.g. region level too high, PTN specific or abbreviated numbers not employed), the received number shall be treated as invalid.

The action to be taken on receipt of a number which is found to be invalid is outside the scope of this Standard.

In all cases, a PTNX shall be able to accept an accompanying subaddress.

8.1.1 Numbering Formats Accepted with Selection Numbers

A PTNX shall be able to accept any of the following numbering formats as a Selection Number.

8.1.1.1 S Reference Point

Any of the numbering formats specified in 7.1 shall be accepted as valid in a received Selection Address, except that for PARTIAL.

NOTE 26

This does not necessarily mean that a calling PTN user actually submits a number when requesting connection establishment. Alternatively, he can have arranged the TE for automatic provision of the Selection Number.

8.1.1.2 Q Reference Point

Any of the numbering formats specified in 7.1 shall be accepted as valid in a received Selection Address, except that for PARTIAL.

8.1.1.3 T Reference Point

A PTNX shall be able to accept any of the formats for DDI numbers specified in ETS 300 062, according to the DDI arrangements.

8.1.2 Numbering Formats Accepted with Identification Numbers

A PTNX shall be able to accept any of the following numbering formats as an Identification Number.

8.1.2.1 S Reference Point

If an access is not arranged for MSN, the PTNX shall provide the identity information and classify it as "PTN PROVIDED".

If a TE provides identity information to the PTNX, the PTNX shall ignore it.

If an access is arranged for MSN, the PTNX shall apply a screening function to the identity information received from a TE on such an access.

The details for the format (explicit/implicit, NPI value, TON value, number of MSN digits in the case of a partial number) depend on the MSN arrangement. The possibilities are given in annex C of this Standard.

The PTNX shall distinguish between the following cases:

a)   **TE provides no identity information**

The PTNX shall provide a default identity information and classify it as "PTN PROVIDED".

b)   **TE provides identity information**

If the identity information corresponds to the MSN arrangement, the PTNX shall proceed accordingly (i.e. complete a partial number, if this was arranged for) and classify the identity information as "USER PROVIDED".

If the identity information does not correspond to the MSN arrangement, the PTNX shall discard the identity information received, replace it with a default identity information according to the MSN arrangement and classify it as "PTN PROVIDED".

8.1.2.2   Q Reference Point

Any of the numbering formats specified in 7.1 shall be treated as valid in a received Identification Number, except that for PARTIAL.

However, a PTNX can instead receive an indication "NUMBER NOT AVAILABLE DUE TO INTERWORKING" or "NUMBER RESTRICTED". This indication shall be accepted and forwarded by the PTNX.

8.1.2.3   T Reference Point

NOTE 27

The format in which a public ISDN offers Identification numbers to a PTN is covered in ETSs 300 089 and 300 094 and is beyond the scope of this Standard.

A PTNX shall be able to accept numbers only with NPI value "E.164" as part of an Identification Address. Any TON values shall be accepted by the PTNX.

However, a PTNX can instead receive an indication "NUMBER NOT AVAILABLE DUE TO INTERWORKING" or "NUMBER RESTRICTED". An addressing request with this indication shall be accepted and forwarded by the PTNX.

A PTNX can optionally convert an ISDN Number into a PNP Number prior to passing it on, if the received ISDN Number is recognized as corresponding to a PNP Number.

8.2   PTNX Requirements for the Provision of Numbers

This sub-clause specifies the numbering formats a PTNX shall use when providing Selection Numbers or Identification Numbers at its various interfaces.

A PTNX shall perform the conversion of a number from one format to another format where necessary in order to meet the requirements below.

In addition, if two adjacent PTNXs are in different regions of the same regional level, a PTNX shall not send a regional number of that level to the other PTNX. Instead, it shall convert the number into a regional number of a higher level by adding the appropriate regional code(s) and changing the TON value accordingly.

8.2.1   Numbering Formats Provided with Selection Numbers

A PTNX shall transmit Selection Numbers in the following numbering formats.

8.2.1.1   S Reference Point

If more than one PNP Number is associated with the access, the PTNX shall transmit the Selection Number across the access. The number shall be provided in either the implicit

numbering format or in one of the explicit numbering formats, see 7.1, according to the details of the MSN arrangement, see annex C.

8.2.1.2   Q Reference Point

A number shall be provided in either the explicit or implicit numbering formats, see 7.1. Any TON value can apply, except that for PARTIAL.

NOTE 28

Reasons for using the E.164 NP in addition to the native NP can be:

- *The calling user has provided an E.164 number for a destination in the public ISDN, and the originating PTNX does not have, or does not choose to use, immediate access to the public ISDN.*

- *The calling user has provided an E.164 number for a destination which is in fact the PTN, and the originating PTNX does not have the capability of deducing the fact that the destination is in the PTN and converting it to a PTN number.*

- *The destination is in the PTN, but the PTNX chooses to send an E.164 number because it knows that routeing via a public ISDN is necessary.*

8.2.1.3   T Reference Point

The format in which a PTNX shall transmit Selection Numbers to the public ISDN is covered in ETS 300 102 and is beyond the scope of this Standard.

NOTE 29

A PTN will be required to submit numbers either

- *in the explicit format with NPI value "E.164" as part of a Selection Number; any TON value can apply, see 7.1, except that for PARTIAL; or*

- *according to the implicit numbering format with the NPI value UNKNOWN.*

8.2.2   Numbering Formats Provided with Identification Numbers

Identification Numbers shall be provided by a PTNX in the following numbering formats.

If there is no number available to send, an indication "NUMBER NOT AVAILABLE DUE TO INTERWORKING" or "NUMBER RESTRICTED" shall be sent instead.

8.2.2.1   S Reference Point

Depending on supplementary services, e.g. Calling Line Identification Presentation, a PTNX can transmit an Identification Number to the TE.

As a PTN management option, the Identification Number can be provided in either the implicit numbering format or in one of the explicit numbering formats, see 7.1.

Any TON value can apply, see 7.1, except that for PARTIAL.

The actual submission of Identification Numbers to the TE is subject to identification supplementary services and is outside the scope of this Standard.

8.2.2.2   Q Reference Point

Identification Numbers shall be interchanged between PTNXs which can be used in the context of supplementary services, e.g. Calling Line Identification Presentation.

An Identification Number can be provided in either the implicit or one of the explicit numbering formats.

Any TON value can apply, see 7.1, except that for PARTIAL.

8.2.2.3 T Reference Point

The format in which a PTNX shall transmit Identification Numbers to the public ISDN is covered by ETSs 300 089 and 300 094 and is beyond the scope of this Standard.

NOTE 30

The Authority of a PTN can agree on a special non-screening arrangement with the operator of the public ISDN, which prevents the public ISDN from screening Identification Numbers submitted by the PTN.

A PTN will be required to submit Identification Numbers either

- *in the explicit format only, with NPI value "E.164". Any TON value can apply except the values NETWORK SPECIFIC NUMBER and ABBREVIATED NUMBER, see 7.1, or*
- *according to the implicit numbering format with the NPI value UNKNOWN.*

If a non-screening arrangement has been established with the public ISDN operator, the PTNX can use the TON values NATIONAL or INTERNATIONAL. In the first case, the PTNX will still be allowed to manipulate the TON value before presenting it to the public ISDN. In the second case, the public ISDN will not manipulate the TON value, depending on whether the receiving user resides outside the country concerned. The number digits need not be part of the ISDN number set which might have been assigned to the PTN-to-public ISDN access in the context of DDI.

If a non-screening arrangement does not exist, the PTN shall present an identification Number according to the arrangement for DDI.

The public ISDN will screen the Identification Number for plausibility, and alter it to SUBSCRIBER, NATIONAL or INTERNATIONAL number as appropriate to the party receiving the Identification Number.

If the number concerned is a PNP Number with no corresponding ISDN Number, no number shall be transmitted.

9 ADDRESS HANDLING REQUIREMENTS OF TERMINALS ATTACHED TO PRIVATE TELECOMMUNICATION NETWORK EXCHANGES

This clause specifies the address handling requirements of terminals for attachment to a PTNX via an interface at the S reference point.

Except for the case of sending a Selection Number and receiving an Identification Number, the requirements apply only when the terminal is to be used on an access which has been arranged for the support of the MSN supplementary service, see annex C.

9.1 Selection Number Handling

9.1.1 Outgoing Calls

A terminal shall transmit a Selection Number either in one of the explicit formats or in the implicit format with the values of NPI and TON, as specified in 7.1.

In the case of the explicit formats, any TON value an apply except PARTIAL.

Within the scope of this Standard any of the NPI values indicated in 7.1 and 7.6 can be used, depending on which numbering domain the addressed entity belongs to.

NOTE 31

The format can vary on a per call basis.

9.1.2 Incoming Calls

A terminal arranged for the support of the MSN supplementary service, shall be able to accept a Selection Number. Its behaviour is specified in clause 10.

The Selection Number received shall be screened against (one of) the Multiple Subscriber Number(s) which the terminal, in the context of the MSN supplementary service, has been arranged for.

If the outcome of the screening process is negative, the terminal shall either explicitly reject or ignore the incoming call request. If the outcome of the screening process is positive, the terminal shall offer the call request to its user.

NOTE 32

Care should be taken when connecting terminals which are arranged for the MSN supplementary service and terminals which are not arranged for the MSN supplementary service in parallel to the same multi-point interface, e.g. a basic rate interface. In such a case, it cannot be guaranteed that the MSN supplementary service is processed correctly. It can happen that a terminal not arranged for the MSN supplementary service reacts faster to an incoming call request than a terminal arranged for the MSN supplementary service, i.e. that the MSN supplementary service is overridden by the basic service.

9.2 Identification Number Handling

9.2.1 Sending of Identification Address

A terminal shall send its multiple subscriber number as (part of) the Identification Number whenever the user originates an outgoing call or answers an incoming call. For the details of the MSN arrangement see annex C.

9.2.2 Reception of Identification Address

If a terminal supports line identification presentation supplementary services, it shall accept an Identification Number identifying another use in a call, e.g. when an outgoing call has been answered or an incoming call is presented.

For the formats to be supported, see 8.2.2.1; for information on terminal interchangeability between private and public ISDNs, see annex D.

10 SUBADDRESSING IN PTNs

In order to cope with cases in which the numbering plan(s) employed by the PTN are not sufficient to unambiguously identify an addressable entity, the PTN shall provide the transfer of subaddress information within its basic services. The length and structure of a subaddress shall follow clause 1.2 of CCITT Rec. I.334.

NOTE 33

Applications of subaddressing can be:

- *Selection of a specific application process at the called user's side;*
- *Presentation of the calling party's identity to the called party;*
- *Presentation of the connected party's identity to the calling party;*
- *Any combination of 1 to 3 above.*

NOTE 34

This allows, in particular, the support of a mobile calling party, when it identifies itself against the called party merely by its subaddress.

According to CCITT Rec. I.334, a subaddress can comprise a sequence of up to 40 digits or up to 20 octets, and shall be accompanied by a Type Of Subadddress (TOS) indicator, which can have the values "NSAP" or "User Specified". Where the TOS indicates "NSAP", the structure of the subaddress shall conform to ISO 8348 AD2.

10.1 Treatment of Subaddresses in a Pure PTN Environment

In the context of basic services a PTNX shall accept and submit a calling or called party's subaddress at its S, T and Q reference points. The PTNX shall not alter the contents nor the format of a subaddress.

If a subaddress is available as part of a Selection Address, it shall be passed on across the access even if no number is transmitted, i.e. when no MSN arrangement exists.

If a subaddress is available as part of an Identification Address, it shall be passed on across the access even if other identification restrictions apply, e.g. CLIR or COLR.

10.2 Treatment of Subaddresses in Interworking Situations

In certain interworking situations, e.g. connection with an LAN, a PTN may be required to process subaddresses, i.e. to analyze them, act upon them and modify them, if applicable.

In this case, a PTNX shall accept and submit subaddresses in accordance with CCITT Rec. I.334.

Processing of subaddresses shall be possible for selection and identification purposes and shall not be subject to other identification restrictions, e.g. CLIR or COLR.

The details for processing subaddresses are subject to the PTN's system management and are outside the scope of this Standard.

10.3 Interworking with the Public ISDN

The receipt of subaddress information as part of the Selection Address from a public ISDN is possible only by use of the public ISDN Subaddressing supplementary service, see ETS 300 059.
For an interim period, some public ISDNs will convey subaddresses of restricted length only.

11 SELECTION ADDRESS HANDLING OF TERMINALS SUPPORTING SUB-ADDRESSING

A terminal with neither an arrangement for MSN nor for subaddressing shall present an incoming call to its user regardless of whether a number or subaddress was received, subject to other requirements being satisfied, e.g. service compatibility, availability of resources.

A terminal with an arrangement for MSN but not for subaddressing shall present an incoming call to its corresponding MSN user only if the number received matches the Multiple Subscriber Number of that user, subject to other requirements being satisfied, e.g. service compatibility, availability of resources.

A terminal arranged for subaddressing but not for MSN shall present an incoming call to its user (or one of its users) only if the subaddress received matches the subaddress of that user, subject to other requirements being satisfied, e.g. service compatibility, availability of resources.

A terminal with arrangement for MSN and subaddressing shall present an incoming call to its user only if the number and subaddress received match both the MSN number and the subaddress of that user, subject to other requirements being satisfied, e.g. service compatibility, availability of resources.

NOTE 35

It is the responsibility of the PTN Authority to ensure that only TEs with compatible selection handling capabilities are operated on basic PTN accesses, see 9.1.2.

NOTE 36

For information on MSN arrangements, see annex C.

Annex A

(informative)

BIBLIOGRAPHY

CCITT E.165	Timetable for Coordinated Implementation of the Full Capability of the Numbering Plan for the ISDN Era (Rec. E.164)
CCITT E.166	Numbering Plan Interworking in the ISDN Era
CCITT F.69	Plan for Telex Destination Codes
CCITT I.330	ISDN Numbering and Addressing Principles
CCITT I.331	(see CCITT E.1164 above)
CCITT I.333	Terminal Selection in ISDN
CCITT X.121	International Numbering Plan for Public Data Networks
CCITT X.122	Numbering Plan Interworking between a Packet Switching Public Data Network (PSPDN) and an Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) in the Short Term
ETS 300 102	ISDN User-Network Interface - Layer 3 Specification for Basic Call Control
ETS 300 050	Integrated Services Digital Network (ISDN) - Multiple Subscriber Number (MSN) Supplementary Service - Service Description
ETS 300 059	Integrated Services Digital Network (ISDN) - Subaddressing (SUB) Supplementary Service - Service Description
ETS 300 089	Integrated Services Digital Network (ISDN) - Calling Line Identification Presentation (CLIP) Supplementary Service - Service Description
ETS 300 094	Integrated Services Digital Network (ISDN) - Connected Line Identification Presentation (COLP) Supplementary Service - Service Description

Annex B

(informative)

USE OF PRIVATE AND PUBLIC ISDN NUMBERING PLANS WITHIN A PTN NUMBERING PLAN

Figure B-1 shows the relationships between the Private Numbering Plan (PNP) and the ISDN Numbering Plan (CCITT Rec. E.164).

Legend: A, B, C: Possible Numbering Domains of Private Telecommunication Networks

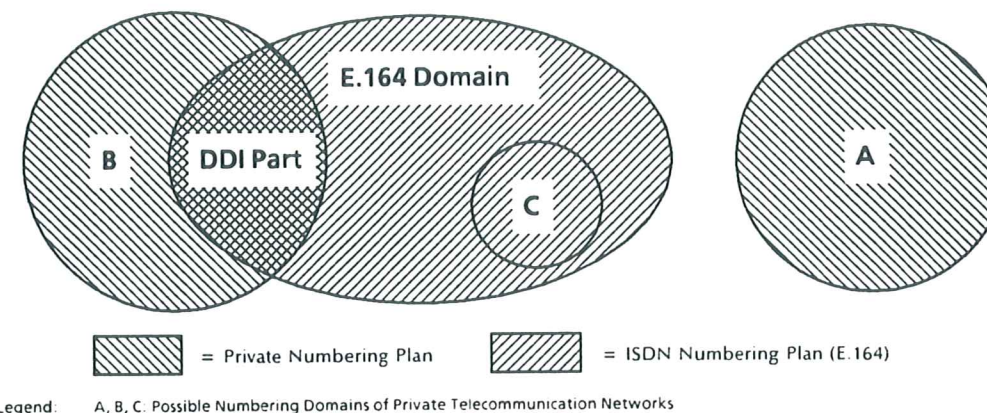▨ = Private Numbering Plan   ▨ = ISDN Numbering Plan (E.164)

Figure B-1: Employment of PNP and/or ISDN Numbering Plans in PTN NPs

Domain A employs a private numbering plan exclusively, which means that its PTN does not provide any addressable entity that could be directly reached from the public ISDN.

Domain B employs a PNP and the ISDN numbering plan, such that each addressable entity within the double-shaded area has a number from each numbering plan.

NOTE B.1

In the extreme, all addressable entities in the domain can have a number from each numbering plan.

Domain C employs the ISDN numbering plan exclusively, which means that no addressable entity can be operated in this domain with a number of a significance different from that of the ISDN NP. Although such a restriction is conceivable in theory, it is very unlikely in practice, since such a concept would preclude also any private network specific or abbreviated number.

Assuming that a PTN typically is connected to the public ISDN numbering domain via its DDI supplementary service, or that, if not so, the PTN Authority may choose at any time to have DDI provided, a PTN will have to be prepared to conform to two numbering plans in parallel, namely:

- its own PNP which, in principle, allows the use of the same digits or digit sequences as in the public ISDN, however, with a different significance, and

- the numbering plan of the public ISDN.

NOTE B.2

Not each of the addressable entities need to be a member of both numbering plans.

Interworking between both numbering plans will be simplified if the PNP number digits form a subset of the ISDN number digits, i.e. when the last significant digits of both numbers are identical. Otherwise,

mapping between the PTN and the public ISDN numbering plan will be more complex and will require the PTN users to publish both numbers separately for intra-PTN and for public ISDN communication.

Annex C

(normative)

MSN ARRANGEMENTS

C.1 Introduction

MSN arrangements allow the use of PTN numbers to identify addressable entities beyond the access at the S reference point. These can be (see clause 7)

- different applications within a given TE and/or

- different TEs attached to an access with a point-to-multipoint configuration.

MSN can be arranged for basic and primary rate PTN accesses.

For the behaviour of the PTN see 8.1.2.1 and 8.2.1.1; for the behaviour of the TE see 9.2.1.

A terminal supporting the MSN supplementary service shall have the capability of being programmed with, and of storing, the digits and parameters of the Multiple Subscriber Number or Numbers which the terminal is to serve. How this information is given to the memory of the TE is a function of the TE's configuration management entity and is beyond the scope of this Standard.

NOTE C.1

A description of the MSN Supplementary Service can be found in ETS 300 050.

C.2 Parameters of the MSN Arrangement

The parameters of the MSN arrangement shall relate to each number individually and shall be independent of the access(es) to which the number(s) are assigned.

For each PTN access a default Identification Number shall be defined, to be used by the PTN if its screening process on TE provided Identification Numbers fail (see 8.1.2.1).

NOTE C.2

The number of Multiple Subscriber Numbers supported by a PTN on a particular basic or primary rate access, or by a terminal, depends on their implementations.

The NPI and TON values which can be employed shall be those indicated in Table 1 of this Standard. As a minimum the PTNX and the TE shall support the combination NPI = UNKNOWN/ TON = UNKNOWN.

NOTE C.3

This enables terminal interchangeability between accesses of a PTN and of a public ISDN.

Annex D

(informative)

TERMINAL INTERCHANGEABILITY

A terminal following this Standard will be interchangeable between public and private ISDN accesses if it supports

- the implicit numbering concept, and/or

- explicitly the ISDN Numbering Plan according to CCITT Rec. E.164 and the Private Numbering Plan as defined in detail in this Standard.

Annex E

(informative)

RELATIONSHIP BETWEEN DIALLING AND NUMBERING PLANS AT THE PTN USER INTERFACE, AND NUMBERING PLANS AT THE PTN-TO-TERMINAL INTERFACE

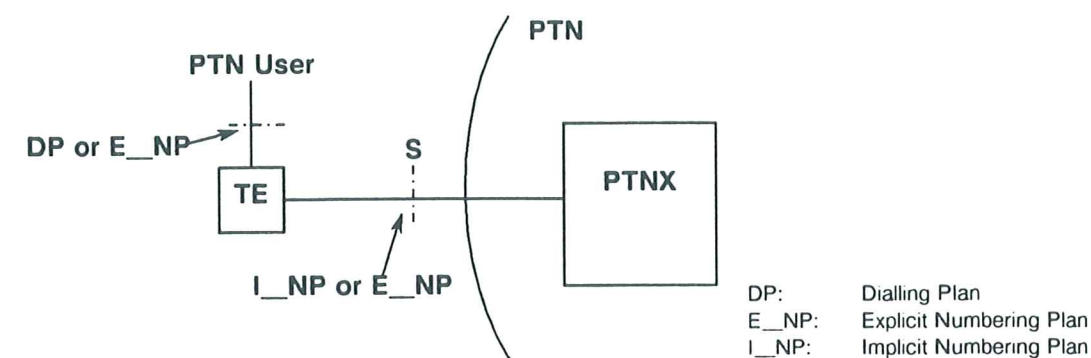An overview of the situation is given in Figure E-1.

Figure E-1 - Relationship between Dialling Plan and Implicit Numbering Plan

Two groups of PTN users of an ISDN can be distinguished: those who are used to the traditional PSTN environment (private or public), and those who are used to the PSDN (Public Switched Data Network) environment. While the first one is used to operating dialling plans, the latter one is largely used to operating explicitly numbering plans.

The actual dialling procedures for a particular TE depends on the design of the operational interface to the PTN user. Name keys, menus or icons on a screen allow a variety of user customized procedures.

However, in essence it must be assumed that the majority of terminals does not have the capability to convert, at the PTN user interface and the terminal to PTN interface, between a dialling plan and an explicit numbering plan. Still, it can and must be assumed that the TEs have the capability to transfer dialling information into an implicit numbering plan (and, if supported, also vice versa for Identification Numbers). Thus, at the PTN-to-terminal interface, the PTN Authority can, and in practice will have to, determine that, beside explicit numbering plans, also an implicit numbering plan should apply.