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Information technology — Telecommunications and information exchange between systems — Numbering and sub-addressing in private integrated services networks

*Technologies de l'information — Télécommunications et échange
d'information entre systèmes — Comptage et sous-adressage dans les
réseaux privés avec intégration de service*



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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 11571 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*.

Annex C forms an integral part of this International Standard. Annexes A, B, D, E and F are for information only.

Introduction

This International Standard is one of a series of ISO Standards applicable to Private Integrated Services Networks. The series uses the ISDN concepts as developed by CCITT and is also within the concepts of Standards for Open Systems Interconnections as defined by ISO.

This particular standard defines Addressing in Private Integrated Services Networks. Its purpose is to serve as a general and common reference for all addressing statements in the other Standards on Private integrated Services Networks.

This International Standard enables the PISN Administrator to choose:

- the ISDN Numbering Plan according to CCITT Recommendation E.164 (1988 Blue Book); or
- a Private Numbering Plan; or
- an Implicit Numbering Plan; or
- any combination of these numbering plans

as the native numbering plan(s) in its PISN.

In addition, the administrator can employ sub-addressing in order to expand the available addressing capacity beyond the capacity of the PISN Numbering Plan (PISN NP).

The impact on terminal interchangeability between accesses of public and private ISDNs can be found in annex D.

Information technology — Telecommunications and information exchange between systems — Numbering and sub-addressing in private integrated services networks

1 Scope

This International Standard defines the requirements for the handling of network addresses for the identification of entities which use/provide telecommunications services offered by Private Integrated Services Networks (PISNs). This International Standard covers numbering, including the requirements for the support of a Private Numbering Plan, and the support of sub-addressing.

This International Standard is applicable to Private Integrated Services Network Exchanges (PINXs) and to terminals attached to the PINXs. Any use by a PINX of the "Support of Private Numbering Plans" supplementary service provided by a public ISDN is outside the scope of this International Standard.

Although this Standard does not explicitly describe its application to location independent (mobile) addressable entities, this application is not precluded.

In order to conform to this International Standard, a PINX shall meet the mandatory requirements of clauses 5, 6, 7, and 9 and for a terminal attached to a PINX it shall meet the mandatory requirements of clauses 8 and 10.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 8348:1993, *Information technology - Open Systems Interconnection - Network Service Definition*.

ISO/IEC 11579:¹⁾, *Information technology - Telecommunications and information exchange between systems - Reference configuration for Private Integrated Services Networking (PISN) Exchanges*.

CCITT Recommendation I.334; 1988. *Principals relating ISDN Numbers/Addresses to the OSI Reference Model Network Layer Addresses*.

CCITT Recommendation E.160, 1988. *Definitions relating to National and International Numbering Plans*.

CCITT Recommendation E.164, 1988. *Numbering Plan for the ISDN Era*.

CCITT Recommendation Q.931, 1988. *ISDN User-Network Interface Layer 3 Specification For Basic Call Control*.

In addition to these normative references, informative references are listed in Annex A.

3 Definitions

The definitions in ISO/IEC 8348 and CCITT Recommendation E.160 shall apply in ascending order (i.e., in the case of conflict the definition in the publication nearest the end of the list shall apply).

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

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

3.1.1.1 PISN Number : A number in the domain covered by a PISN Numbering Plan.

¹⁾ To be Published

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

3.1.2 Sub-address : A part of an address beyond the addressing capability of a numbering plan.

3.2 Domain : The range of responsibility of a PISN Administrator for setting up numbering and/or addressing plans.

3.2.1 Sub-domain : A part of a domain where the responsibility for administering numbering and/or addressing plans is delegated to a subordinate PISN Administrator.

3.3 Explicit Numbering Plan : A numbering plan in which each number is accompanied by an indication as to which numbering plan applies.

3.4 Implicit Numbering Plan : A numbering plan in which no explicit indication is given to indicate which numbering plan applies. Instead the identification has to be determined from the number digits themselves.

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

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

3.5 Native Numbering Plan : The numbering plan employed by a PISN Administrator in a given network in a way in which it unambiguously identifies the addressable entities of a PISN.

3.6 Foreign Numbering Plan : A numbering plan not native to a given PISN, however, supported by it in so far as that it is known to the given PISN.

3.7 Private Integrated Services Network Numbering Plan (PISN NP) : The generic designation for the numbering plan(s) chosen as native by a PISN Administrator for its particular PISN.

3.8 ISDN Numbering Plan (ISDN NP) : The numbering plan explicitly relating to global ISDN as defined by CCITT Recommendation E.164.

NOTE - The ISDN NP can fulfill the function of the PISN NP.

3.9 Private Numbering Plan (PNP) : The numbering plan explicitly relating to a particular private numbering domain, defined by the PISN Administrator of that domain.

NOTE - The PNP can fulfill the function of the PISN NP.

3.9.1 PNP Number : A number belonging to a PNP.

3.9.2 Region : The entire domain or a sub-domain of a PNP.

NOTE - A region does not necessarily correspond to a geographical area of a PISN.

3.9.3 Region Code (RC) : The leading digits of a PNP Number which identify a region.

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

3.9.4 Regional Number (RN) : A particular form of a PNP Number which is unambiguous in the region concerned.

3.9.5 Complete Number (CN) : A number which is unambiguous in the entire PNP, i.e., which corresponds to the highest regional level employed in that PISN.

3.10 Unknown Numbering Plan : The numbering plan reflecting a dialling plan which is implicitly based on a particular private numbering domain as defined by the PISN Administrator.

3.11 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.

3.12 Numbering Plan Identifier (NPI) : An indication of the numbering plan to which a number belongs; it is separate from the number itself.

3.13 Type of Number (TON) : An indication which distinguishes the various complete and shortened forms of a number; it is separate from the number itself.

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

3.15 Selection Address/Number : An address or a number used to select an addressable entity to which a call is to be established.

NOTE - This term also applies to addresses in general, i.e., also to sub-addresses.

3.16 Identification Address/Number : An address or a number when used to present an addressable entity identity to another user.

NOTE - This term also applies to addresses in general, i.e., also to sub-addresses.

3.17 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").

3.18 PISN Administrator : The entity that has the function and responsibility of administering numbering and/or addressing plans for the PISN under their purview.

4 Symbols and abbreviations

AFI	Addressing plan and Format Identifier
CN	Complete Number
CLIR	Calling Line Identification Restriction
COLR	Connected Line Identification Restriction
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
PINX	PISN Exchange
PISN NP	PISN Numbering Plan
PISN	Private Integrated Services Network
PSTN	Public Switched Telephone Network
Q	Q Reference Point
RC	Region 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 Sub-Address

5 PISN addressable entities

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

NOTES 1 An addressable entity can be associated with:

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

2 A PISN number is not required to identify a particular channel of an interface that is comprised of more than one channel. Indirect identification can however, occur, e.g., when a PISN number identifies a one-to-one correspondence between the interface and a particular application with a one-to-one correspondence to a particular channel.

3 A particular PISN number can fulfill only one of these functions.

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

6 Requirements on numbering plans, and on their interrelationships

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

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

- the ISDN numbering plan according to CCITT Recommendation E.164 [4], hereafter referred to as "ISDN NP"; or
- a Private Numbering Plan, hereafter referred to as "PNP"; or
- an Implicit Numbering Plan; or
- any combinations of these numbering plans.

In order for the PISN to employ CCITT Recommendation E.164 as the native numbering plan, the PISN Administrator must first secure the allocation of the numbering resources from the appropriate national body of those resources.

NOTE - For further information on the use of these numbering plans see informative annex B.

For the purpose of this International Standard,

- the addressing domain of a PISN shall be assumed to be the whole PISN. If a PISN is divided into two or more addressing domains, each with its own PISN NP, each addressing domain shall be considered to be a separate PISN.
- communication between one addressing domain and another addressing domain shall be treated as interworking between two PISNs.
- a single addressing domain spanning more than one PISN shall be considered as a single PISN.

6.1 Content of PISN 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	Explicit Format	Implicit Format
NPI	E.164	PNP	UNKNOWN
TON	International Number	Level 2 Regional Number	
	National Number	Level 1 Regional Number	
	Subscriber Number	Level 0 Regional Number	
		(Local Number)	
	Partial Number (Note 1)	Partial Number (Note 1)	
	Unknown (Note 1)	Unknown (Note 1)	Unknown (Note 2)
		PISN Specific Number (Note 3)	
		Abbreviated Number (Note 3)	

NOTES 1 In the standards on DSS1 of public ISDNs the TON values "Unknown" and "Partial" share the same code points. Distinction is made by the direction of the number information flows.

At the boundary between the public ISDN and a PINX the meaning for Selection Numbers is "Unknown" if the information flow is to the public ISDN, and the meaning is "Partial" if 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 PISN and its terminals the meaning for Selection Numbers is "Partial" if the information flow is from the PISN 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 PINX. For Identification Numbers the meaning is reversed.

- 2 The number digits follow an implicit numbering plan and can include prefixes.
- 3 The use of this type of number is under the control of the PISN Administrator and the application is outside the scope of this standard.

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.

6.2 Content of the number digits in a PISN numbering plan

6.2.1 ISDN NP

The content of digits of the ISDN NP is outside the scope of this International Standard. Information can be found in CCITT Recommendation E.164 [4].

6.2.2 PNP

A PNP Number shall be comprised of 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 a different value of x . The maximum value of x shall be the same as for the public ISDN numbering plan, see CCITT Recommendation E.164 [4].

- NOTES 1 Within this range, the minimum/maximum value of x in a particular PISN will be determined by the PISN Administrator.
- 2 It is the PISN Administrator's responsibility to choose the appropriate numbering capabilities of the PINX and terminals for that PISN.

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

- 3 The definition of prefixes (e.g., decimal digits and/or special or alpha characters like *, #, A, B, C...) is the responsibility of the PISN Administrator and is outside the scope of this International Standard.

6.2.3 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 - The definition of prefixes (e.g., decimal digits and/or special or alpha characters like *, #, A, B, C...) is the responsibility of the PISN Administrator and is outside the scope of this International Standard.

6.3 Structure of the 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 PISN.

NOTE 1 A region (i.e., Level 0, 1, or 2) will typically be comprised of one or more PINXs; but in principle there is nothing to prevent a numbering boundary from occurring inside a PINX.

Different levels of region are made possible by using regions 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 regioning encompasses the entire PNP. A PNP Number which has significance within level n 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 PISN shall be two corresponding to three levels in total. See annex F for an example.

NOTES 2 The parsing (i.e., the analysis and interpretation of digits) within a given level is outside the scope of this International Standard.

- 3 In a PNP without hierarchical structure, level 0 is the level that exists.

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 Regional Number shall be called a local number (LN). A Regional Number for the highest level which exists within a PNP shall be called a complete number (CN).

A level n Regional Number with n greater than 0 shall include a level $n-1$ Regional Number and a level $n-1$ region code (RC) identifying the level $n-1$ region to which the level $n-1$ Regional Number belongs. The level $n-1$ RC shall occupy the leading digits of the level n Regional Number, and the level $n-1$ Regional Number shall occupy the trailing digits. This is illustrated in Figure 1.