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**Information technology —  
Telecommunications and information  
exchange between systems — Private  
Integrated Services Network —  
Circuit-mode 64 kbit/s bearer services —  
Service description, functional  
capabilities and information flows  
(standards.iteh.ai)**

*Technologies de l'information — Télécommunications et échange  
d'information entre systèmes — Réseau privé à intégration de  
services — Services porteurs sur 64 kbit/s en mode circuit —  
Description du service, aptitudes fonctionnelles et flux d'informations*

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 11574 was prepared by ECMA (as ECMA-142) and was adopted, under a special “fast-track procedure”, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

This second edition cancels and replaces the first edition (ISO/IEC 11574:1994), which has been technically revised.

Annexes A and B form a normative part of this International Standard. Annexes C and D are for information only.

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## Introduction

This International Standard is one of a series of standards defining services and signalling protocols applicable to Private Integrated Services Networks (PISNs). The series uses ISDN concepts as developed by ITU-T and conforms to the framework of International Standards for Open Systems Interconnection as defined by ISO/IEC.

This International Standard contains specifications of basic services.

This International Standard is based upon the practical experience of ECMA member companies and the results of their active and continuous participation in the work of ISO/IEC JTC1, ITU-T, ETSI and other international and national standardization bodies. It represents a pragmatic and widely based consensus.

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# Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Circuit-mode 64 kbit/s bearer services — Service description, functional capabilities and information flows

## Section 1: General

### 1 Scope

This International Standard specifies the service description and control aspects, including functional capabilities and information flows, of standardised circuit-mode bearer services which may be supported by a Private Integrated Services Network (PISN).

This International Standard includes the following basic services:

- Circuit-mode 64 kbit/s unrestricted 8 kHz structured bearer service category;
- Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for speech information transfer;
- Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for 3,1 kHz audio information transfer.

A PISN shall support at least one of the above three bearer services to conform with this International Standard.

The scope of this International Standard does not include:

- the negotiation of service at call establishment time,
- the change of service during a call, and
- unidirectional services.

This International Standard includes optional procedures for the provision of functions equivalent to the following public ISDN supplementary services: Subaddress and Multiple Subscriber Number

NOTE 1 - Supplementary services and other bearer services which can be used in conjunction with 64 kbit/s circuit switched bearer services specified in this International Standard are dealt with in other standards.

NOTE 2 - Service specifications are based on information concerning the corresponding public ISDN service available at the time of publication of this International Standard.

NOTE 3 - ITU-T treat Subaddressing and Multiple Subscriber Number as supplementary services.

NOTE 4 - The use of the Direct Dial In supplementary service of a public ISDN for calls incoming to a PISN from a public ISDN is regarded as part of the basic services in a PISN.

NOTE 5 - The use of the Calling Line Identification Presentation and Connected Line Identification Presentation supplementary services of a public ISDN for obtaining the Originating Number or the Connected Number of a call from or to a public ISDN is regarded as part of the basic services in a PISN.

NOTE 6 - The provision (either explicitly or implicitly) by the user to the network, of its own number (Originating Number or Connected Number), and the provision of an Originating Number or a Connected Number by a PISN to another network is a part of the basic services in a PISN and not a part of the Calling Line Identification Presentation and Connected Line Identification Presentation supplementary services. Those supplementary services are concerned only with the presentation of the number from the network to the served PISN user.

### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 11571:1998, *Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Addressing*.

ISO/IEC 11579-1:1994, *Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Part 1: Reference configuration for PISN exchanges (PINX)*.

ITU-T Rec. G.711:1988, *Pulse code modulation (PCM) of voice frequencies.*

ITU-T Rec. I.112:1993, *Vocabulary of terms for ISDNs.*

ITU-T Rec. I.140:1993, *Attribute technique for the characterization of telecommunications services supported by an ISDN and network capabilities of an ISDN.*

ITU-T Rec. I.210:1993, *Principles of telecommunications services supported by an ISDN and the means to describe them.*

ITU-T Rec. I.231:1988, *Circuit-mode bearer service categories.*

ITU-T Rec. I.251.1:1992, *Number identification supplementary services — Direct Dialling-In.*

ITU-T Rec. I.251.3:1992, *Number identification supplementary services — Calling Line Identification Presentation.*

ITU-T Rec. I.251.5:1995, *Number identification supplementary services — Connected Line Identification Presentation (COLP).*

ITU-T Rec. I.520:1993, *General arrangements for network interworking between ISDNs.*

ITU-T Rec. X.31:1995, *Support of packet-mode terminal equipment by an ISDN.*

### 3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply. For other terms used in this International Standard, the definitions in ISO/IEC 11579-1 and ITU-T Rec. I.112 apply.

**3.1 call :** The instance of the use of a service.

**3.2 intervening network (IVN) :** The generic term for any real type of network which is employed for the provision of inter-PINX connections.

**3.3 mixed public/private ISDN :** An overall ISDN which consists of any concatenation of public/private networks.

NOTE 7 - Services are transparent to the users across public and private network components of a mixed public/private network.

**3.4 network call control entity :** The collection of network functions concerned with the control of services, as opposed to functions concerned with the transfer of user information.

**3.5 Private Integrated Services Network (PISN) :** A private network providing services to a specific set of users.

NOTE 8 - Contrary to a Public ISDN which provides services to the general public.

NOTE 9 - The term PISN covers more than a private ISDN.

**3.6 Private Integrated Services Network Exchange (PINX) :** A PISN nodal entity which provides automatic connection handling functions used for the provision of telecommunication services. A nodal entity may consist of one or more nodes.

**3.7 PISN user :** An entity which uses telecommunication services offered by a PISN, and which therefore directly or indirectly uses the services of the Network Layer.

**3.8 service [Telecommunication services] :** That which is offered by a PISN operator and/or owner to its customers in order to satisfy a specific telecommunication requirement.

Unless otherwise stated, the term “service” shall mean “bearer [telecommunication] service”.

**3.9 user :** An entity which uses telecommunication services offered by a network, and which therefore directly or indirectly uses the services of the Network Layer.

### 4 Symbols and abbreviations

CC	Clearing Cause
CC [FE]	Call Control generic functional entity
CCA	Call Control Agent generic functional entity
cfm   c	confirmation
CH	Call History
CI	Channel Identifier
CN	Connected Number
CS	Connected Subaddress

CT	Connection Type
DN	Destination Number
DS	Destination Subaddress
FE	Functional Entity
HLC	High Layer Compatibility
ind   i	indication
ISDN	Integrated Services Digital Network
ISO	International Organisation for Standardisation
LLC	Low Layer Compatibility
NC	Number complete indication
ON	Originating Number
OS	Originating Subaddress
OSI	Open Systems Interconnection
PINX	Private Integrated Services Network Exchange
PISN	Private Integrated Services Network
PSTN	Public Switched Telephone Network
Rec.	(ITU-T) Recommendation
req   rq	request
resp   rs	response
RT	Report Type
SDL	Specification and Description Language
TE	Terminal Equipment

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## 5 Provision of services by a PISN

Basic services within a PISN consist of bearer services and teleservices. A bearer service is defined only up to a certain layer, in any case no higher than Layer 3. The definition of a teleservice also encompasses the higher layers up to Layer 7 (although some of the layers can be empty or not specified, as with for example, Telephony).

The basic services defined in this International Standard correspond to the 64 kbit/s circuit-mode basic services defined in ITU-T Recommendation I.231.

### 5.1 Bearer services

PISN circuit-mode bearer services provide a means of transferring information between users at the physical layer level. Service attributes above Layer 3 are not defined. Consequently, the provision of bearer services involves only low layer functions. A bearer service can support a variety of high layer protocols.

A circuit-mode bearer service provides an end to end connection (at the physical layer) for the conveyance of user information. Each switching point intervenes only at the physical layer. This gives a constant bit rate and fixed delays which are very close to the inherent delays of the transmission media.

### 5.2 Teleservices

The provision of a teleservice involves high layer functions, generally using the underlying low layer capabilities of a bearer service. A PISN can support a teleservice by supporting a bearer service having the same capabilities as those required by the teleservice and by satisfying any special control requirements of the teleservice. The provision of high layer functions in support of a teleservice is not a necessary part of a PISN and is beyond the scope of this International Standard.

When requesting a teleservice from a PISN, the user has to explicitly indicate the bearer capabilities required in the same way as when a bearer service is requested. In addition, an indication of the teleservice required is provided by the PISN user,

primarily for passing the indication through the network to the called PISN user in order to allow compatibility checking. A PISN can optionally make use of this information for purposes such as barring certain teleservices to certain PISN users, or for the provision or activation of supplementary services on a per teleservice basis, e.g., call forwarding. Any use of this information by a PISN is outside the scope of, but is not precluded by, this International Standard.

Annex B provides guidelines for, and additional information about, teleservices.

**5.3 Control and signalling**

In order for information transfer to take place, an information connection must exist between the PISN users concerned. A demand service involves the establishment and release of information connections according to the demands of users. From the point of view of users, calls have to be established and released, and this involves call control functions. Call control requires knowledge of the properties of the user information to be transferred in order to provide appropriate capabilities.

In general, more than one network element (e.g., PINX, terminal) is involved in a call, and therefore call control is distributed. Consequently call control information needs to be conveyed between network elements. The conveyance of this information is a function of signalling.

PISN services use message based signalling information, which means that signalling information is carried over a dedicated logical connection, separate from the connection established for conveying user information.

NOTE 10 - The possible use of the signalling connection also to provide user-to-user information transfer is the function of the User-to-User Signalling supplementary service, and is outside the scope of this International Standard.

**5.4 Interworking considerations**

In general, interworking between a PISN bearer service and a bearer service provided by another network requires interworking functions, both for information transfer and for signalling.

When interworking with the same service in a public ISDN, the interworking function for information transfer is null. However, interworking has an impact on signalling.

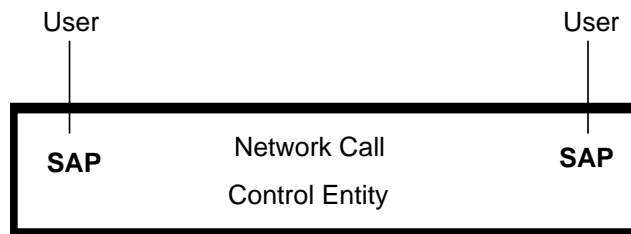
**5.5 Service model**

This International Standard uses the following service model in order to specify services.

The PISN provides bearer capabilities between end users for the support of the bearer service requested by the user to support applications. The PISN user controls the bearer capabilities through the control plane. Coordination between the bearer capabilities and the control plane is maintained by each PINX involved in the connection.

The user terminal interfaces are identified by an address, which in a PISN is defined by a PISN number or a concatenation of a number and a Subaddress.

The control plane processes address information along with other parameters as necessary to effect the necessary routing. This International Standard views control functions as services being provided by a Network Call Control entity, which are accessible through control service access points. Coordination functions use the services of the Network Call Control entity when coordinating call control with the transfer of user information, thereby providing bearer capability to PISN users. Unless explicitly stated the terms “network” and “Network Call Control Entity” are used interchangeably. See figure 1.



SAP = Service Access Point

**Figure 1 – Service model**

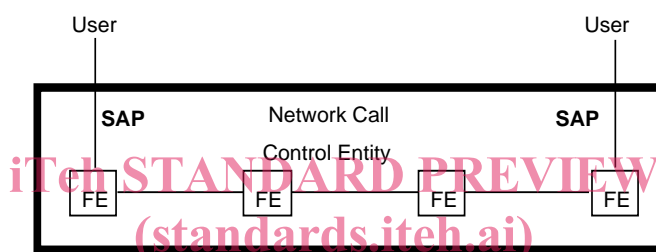
The primitives used across Network Call Control service access points are as follows.

- SETUP\_request / indication / response / confirmation; used for call establishment.

- RELEASE\_request / indication / response / confirmation; used for call rejection and release.
- REPORT\_request / indication; used for reporting to the calling user:
  - that the call is proceeding,
  - that the called PISN user is being alerted,
  - the presence of in-band tones or announcements, and
  - of interworking situations.
- INFORMATION\_request; used for providing additional destination addressing information not provided with the SETUP\_request.

In the Stage 1 description, the control aspects of services are specified in terms of the primitives listed above at the Network Call Control service access points. The entire Network Call Control is treated as a single entity.

In the Stage 2 description, the internal behaviour of Network Call Control is specified by breaking it down into a number of Functional Entities (FE) and specifying the information flows between them. The result is a model of the form shown in figure 2. The particular model used for the basic call is specified in section 3 of this International Standard. Other models based on this generic model are used for specifying supplementary services. Supplementary services are not specified in this International Standard.



SAP = Service Access Point

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Figure 2 – Generic model for Stage 2

## Section 2: Service Description (stage 1 description)

### 6 Circuit-mode 64 kbit/s unrestricted 8 kHz structured bearer service category

#### 6.1 Definition

This bearer service category provides information transfer at 64 kbit/s without alteration between PISN users. The service can support various PISN user applications. Examples include:

- speech (see Note 11);
- 3,1 kHz audio (see Note 11);
- multiple subrate information streams multiplexed into 64 kbit/s by the PISN user;
- transparent access to a public or private X.25 network (ITU-T Rec. X.31 case A for access to a public X.25 network).

NOTE 11 - Whilst speech and 3,1 kHz audio have been given as applications for this bearer service, the PISN user should ensure that a compatible encoding scheme is in operation. In any case, no network provision can be made for the control of such items as echo and loss, as the network is unaware of the application in use. Furthermore, the quality of service attribute value for information transfer delay indicates the suitability of a particular version of this bearer service for speech communication.

#### 6.2 Description

This circuit-mode bearer service category allows:

- two PISN users to communicate in a point to point configuration via the network using 64 kbit/s digital signals, in both directions continuously and simultaneously for the duration of a call;
- in conjunction with a conference call supplementary service (the procedures of which are outside the scope of this International Standard), three or more PISN users to communicate in a multi-point configuration.

Once the information channel connection has been established according to the procedures described in clauses 9 to 11, it is available for the transmission of 64 kbit/s digital signals in both directions continuously and simultaneously, without alteration by the network. The network shall place no restrictions on the content of the digital signals.

### 6.3 Procedures

These are common to all services in this International Standard and are given in clause 9.

### 6.4 Network capability for charging

This is outside the scope of this International Standard.

### 6.5 Interworking considerations

#### 6.5.1 Interworking with a public ISDN and certain other digital networks

Services in this category are able to interwork with the same services in a public ISDN. The interworking function for user information transfer is null.

#### 6.5.2 Interworking with networks supporting only a restricted digital information transfer capability

During an interim period, some other networks may only support restricted 64 kbit/s digital information transfer capability, i.e., information transfer capability solely restricted by the requirement that the all-zero octet is not allowed. Interworking can be achieved according to the rules given in Appendix I of ITU-T Rec. I.520 (the PISN being treated as an ISDN with unrestricted 64 kbit/s capability). The PISN shall assume that the interworking functions are provided in the other network. The PISN need not be affected by this interworking, other than by conveying the appropriate signalling indication to and from the user.

#### 6.5.3 Interworking with analogue networks

The PISN may support calls between data terminals and an analogue network. In this case the following procedures apply.

A V-series terminal<sup>1</sup> shall be connected to the PISN via a terminal adaptor. The PISN shall provide an interworking function (including a modem) for calls to or from a user of an analogue network (e.g., PSTNs or private analogue networks). To effect a connection, the PISN should use a 64 kbit/s unrestricted connection between its user and the interworking function, and a 3,1 kHz audio connection (or equivalent) from the interworking unit to the analogue network.

NOTE 12 - If additional information concerning layer 1 protocols is available, the PISN may provide the interworking function.

In general, when a call originates in an analogue network, the analogue network is unable to indicate to the PISN the service required. If this is the case, the called PISN user is offered a 3,1 kHz audio bearer service with an indication of such interworking.

NOTE 13 - If at the called PISN user there is a terminal adaptor which is unable to accept an incoming 3,1 kHz audio call but is able to accept an incoming 64 kbit/s unrestricted call, the introduction of an interworking function in the PISN can be achieved only if there is service negotiation between the PISN and the called terminal adaptor. This capability is outside the scope of this International Standard.

### 6.6 Static Description: Service Attributes

For details concerning the structuring of service attributes, see annex A.

#### • Dominant information transfer attributes

The dominant information transfer attribute values for this service category shall be:

- 1) Information transfer mode: circuit;
- 2) Information transfer rate: 64 kbit/s;
- 3) Information transfer capability: unrestricted;
- 4) Structure: 8 kHz integrity.

#### • Secondary information transfer attributes

The secondary information transfer attribute values for this service category shall be:

- 5) Establishment of communication: demand or reserved or permanent (see Note 14);
- 6) Symmetry: bidirectional symmetric or unidirectional (see Note 15);

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<sup>1</sup> Terminals that support certain ITU-T Recommendations such as V.24, V.28, V.10 and V.11.



7) Communication configuration: point-to-point or multi-point (see Note 16).

- **Access attributes**

The access attribute values for this service category shall be (see Note 17):

8) Access channel: B;

9) Access protocol: Not defined.

NOTE 14 - Only demand services are specified in this International Standard.

NOTE 15 - Only bidirectional symmetric services are specified in this International Standard.

NOTE 16 - Only point-to-point services are specified in this International Standard. Multi-point configurations can be achieved using conference call supplementary services.

NOTE 17 - The access attributes refer only to the user information not the signalling information.

## 7 Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for speech information transfer

### 7.1 Definition

This bearer service category is intended to support speech.

User information shall conform to ITU-T Rec. G.711 (A-law or  $\mu$ -law). The network may use processing techniques appropriate for speech such as analogue transmission, echo cancellation and low bit rate voice encoding. Hence, bit integrity is not assured. This bearer service category is not intended to support modem generated voice band data.

All ITU-T recommendations for the transfer of speech information in a network apply to this service.

### 7.2 Description

This circuit-mode bearer service category allows:

- two PISN users in a point-to-point configuration to communicate in a point to point configuration via the network using speech encoded into 64 kbit/s digital signals, in both directions continuously and simultaneously for the duration of a call;
- in conjunction with a conference call supplementary service, three or more PISN users to communicate in a multi-point configuration.

Once the information channel connection has been established according to the procedures described in clauses 9 to 11, it is available for the transmission of speech encoded into 64 kbit/s digital signals in both directions continuously and simultaneously. Bit integrity is not assured. The network may use analogue transmission.

The network shall provide tones and announcements to indicate the progress or otherwise of a call.

### 7.3 Procedures

These are common to all services in this International Standard and are given in clause 9.

### 7.4 Network capability for charging

This is outside the scope of this International Standard.

### 7.5 Interworking considerations

#### 7.5.1 Interworking with a public ISDN and certain other digital networks

Services specified in this International Standard are able to interwork with the same services in a public ISDN. The interworking function for user information transfer is null.

#### 7.5.2 Interworking with analogue networks

This bearer service category is able to interwork with PSTNs and private analogue networks when calls originate in the PISN. For calls from an analogue network to the PISN, the analogue network is generally unable to indicate the service required, and in this case the PISN provides a 3,1 kHz audio bearer service rather than a speech bearer service, in order to allow for the possibility of voice band data. Calls from the PSTN shall always use 3,1 kHz audio.

#### 7.5.3 Encoding law conversion

The PISN may provide A-law/ $\mu$ -law conversion (see ITU-T Rec. G.711) to permit interworking between terminals and interfaces to other networks which do not all conform to the same encoding law (A-law or  $\mu$ -law).