ATIS-1000604.2014(R2019)

Integrated Services Digital Network (ISDN) – Minimal Set of Bearer Services for the Basic Rate Interface

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ATIS-1000604.2014(R2019), *Integrated Services Digital Network (ISDN) – Minimal Set of Bearer Services for the Basic Rate Interface*

Is an American National Standard developed by the **Signaling, Architecture, and Control (SAC)** Subcommittee under the **ATIS Packet Technologies and Systems Committee (PTSC).**

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American National Standard for Telecommunications

Integrated Services Digital Network (ISDN) – Minimal Set of Bearer Services for the Basic Rate Interface

Alliance for Telecommunications Industry Solutions

Approved June 2014

American National Standards Institute, Inc.

Abstract

This standard defines the minimal set of bearer services for the ISDN basic rate interface, which conforms closely to ITU-T architectural concepts and explicitly considers the service constraints in the telecommunications environment of the United States.

Foreword

The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. As such, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

The Alliance for Telecommunication Industry Solutions (ATIS) serves the public through improved understanding between providers, customers, and manufacturers. The Packet Technologies and Systems Committee (PTSC) develops and recommends standards and technical reports related to services, architectures, and signaling, in addition to related subjects under consideration in other North American and international standards bodies. PTSC coordinates and develops standards and technical reports relevant to telecommunications networks in the U.S., reviews and prepares contributions on such matters for submission to U.S. ITU-T and U.S. ITU-R Study Groups or other standards organizations, and reviews for acceptability or per contra the positions of other countries in related standards development and takes or recommends appropriate actions.

ANSI guidelines specify two categories of requirements: mandatory and recommendation. The mandatory requirements are designated by the word *shall* and recommendations by the word *should*. Where both a mandatory requirement and a recommendation are specified for the same criterion, the recommendation represents a goal currently identifiable as having distinct compatibility or performance advantages.

Suggestions for improvement of this document are welcome. They should be sent to the Alliance for Telecommunications Industry Solutions, PTSC, 1200 G Street NW, Suite 500, Washington, DC 20005.

At the time of consensus on this document, PTSC, which was responsible for its development, had the following leadership:

M. Dolly, PTSC Chair (AT&T)
V. Shaikh, PTSC Vice-Chair (ACS)
M. Dolly, PTSC SAC Chair (AT&T)

The **SAC** Subcommittee was responsible for the development of this document.

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Integrated Services Digital Network (ISDN) – Minimal Set of Bearer Services for the Basic Rate Interface

1 Scope

In this standard, the minimal set of bearer services for the basic rate interface for the integrated services digital network (ISDN) that conforms closely to the architectural concepts described by ITU-T are defined. The telecommunications environment in the United States for the ISDN basic rate interface is explicitly considered.

The bearer services defined in this standard are the minimal set of services defined in Bearer Services Supported by and ISDN, ITU-T Recommendation I. 211[1], which are to be supported by public networks for the ISDN basic rate interface.

The description method used by ITU-T, which is called the "method for the characterization of telecommunication services supported by an ISDN al)d network capabilities of an ISDN," is summarized in Section 4, and the description of the essential bearer services that should be supported by a public ISDN in the United States follows in Section 5. The signaling procedures for these bearer services are defined in American National Standard for Telecommunications - Integrated Services Digital Network (ISDN) Data-Link Layer Signalling Specification for Application at the User-Network Interface, ANSI ATIS-1000602, American National Standard for Telecommunications - Integrated Services Digital Network (ISDN) Layer-3 Signaling Specification for Circuit-Switched Bearer Service for Digital Subscriber Signaling System Number I (DSSSI), ATIS-1000607, and American National Standard for Telecommunications- Integrated Services Digital Network (ISDN)- Layer-3 Signaling Specification for X.25 Packet- Switched Bearer Service for Digital Subscriber Signaling System Number I (DSSS1), ANSI ATIS-1000608 Digital communication between the user and the network equipments is defined in American National Standard for Telecommunications -Integrated Services Digital Network (ISDN)- Basic Access Inter- face for Use on Metallic Loops for Application on the Network Side of the NT (Layer I Specification), ATIS-100601, and American National Standard for Telecommunications - Integrated Services Digital Network (ISDN) -Basic Access Interface for S and T Reference Points (Layer 1 Specification), ATIS-0600605.

1.1 The Minimal Set of Bearer Services.

The intent of this standard and its relationship to ATIS-0600601, ATIS-1000602, ATIS-0600605, ATIS-1000607, services that should be supported by a public ISDN and ATIS-1000608 are:

(1) The services defined in this standard are considered to be essential for provision by public net- works. The availability of these services may depend on the subscription profile of the user. This core set of

[1] The designation numbers for the ITU_T Recommendations that appear in this standard refer to the 1993 ITU-T Red Book. Contact the secretariat for more recent information.

services is required as a solid foundation on which subsequent ISDN standards may be built. Subsequent standards can include nonessential bearer services and supplementary services.

(2) ATIS-0600601, ATIS-1000602, ATIS-0600605, ATIS-1000607, and ATIS-1000608include signaling procedures for those bearer services described in this standard.

(3) Customer premises equipment implementations, when viewed from the user-public-network interface, need only implement the procedures described in ATIS-0600601, ATIS-1000602, ATIS-0600605, ATIS-1000607, and ATIS-1000608 include that are associated with the minimal set of bearer service(s) supported by that equipment; for example, a voice-only terminal equipment (TE) could implement only the procedures for circuit-mode speech (bearer capability information element, and the like) and not implement those for circuit-mode digital.

(4) Devices that support the bearer services defined in this standard by implementing associated procedures described in other American National Standards and using the default parameters and other specified mandatory parameters are expected to inter- operate successfully. ("Successfully" means that they work together to obtain/provide the appropriate bearer service.)

1.2 Relationship to Capabilities beyond the Mini- mal Set of Bearer Services.

It is likely that ISDN implementations will provide capabilities beyond those defined in this standard. Some of these capabilities will eventually be standardized, while others will be specific to an implementation. The following guidelines define the relationship of these additional capabilities to this standard.

(I) The network, when viewed from the user-network interface, may also provide other additional services, capabilities, protocols, functions, and procedures not described in this standard or any American National Standard. These may or may not be invoked by a particular user at a particular user-public-network interface.

(2) Customers premises equipment may implement additional services, capabilities, protocols, functions, and procedures not described in this standard or the American National Standards on signaling (ATIS-1000607 and ATIS-1000608). These may or may not be supported by a particular network at a particular user-network interface.

(3) The implementation of the additional aspects mentioned in the previous two points does not, therefore, make the user or network noncompliant with this standard or with ATIS-0600601, ATIS-1000602, ATIS-0600605, ATIS-1000607, and ATIS-1000608 include.

(4) Some or all of the additional aspects mentioned in 1.2(1) and 1.2(2) may be described in other standards; e.g., standard signaling for a standard supplementary service.

2 Referenced and Related Standards

2.1 Referenced American National Standards.

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

ATIS-0600601.1999(R2014), Telecommunications- Integrated Services Digital Network (ISDN)- Basic Access Interface for Use on Metallic Loops for Application on the Network Side of the NT (Layer I Specification)[2]

ATIS-1000602.1996(R2014), Telecommunications- Integrated Services Digital Network (ISDN) -Data-Link Layer Signalling Specification for Application at the User-Network Interface[3]

ATIS-0600605.1991(R2014), Telecommunications- Integrated Services Digital Network (ISDN) -Basic Access Interface for S and T Reference Points (Layer 1 Specification)[4]

ATIS-1000607.2000(R2009), Telecommunications Integrated Services Digital Network- Layer-3 Signaling Specification for Circuit-Switched Bearer Service for Digital Subscriber Signaling System Number 1 (DSSS1)'[5]

ATIS-1000608.1991(R2012), Telecommunications- Integrated Services Digital Network- Layer-3 Signaling Specification for X.25 Packet-Switched Bearer Service for Digital Subscriber Signaling System Number 1 (DSSS1)'[6]

2.2 Other Referenced Standards.

This standard is also intended to be used in conjunction with the following standards:

ITU-T Recommendation G.711, Pulse Code Modulation (PCM) of Voice Frequencies[7]

ITU-T Recommendation I.211, Bearer Services Supported by an ISDN[8]

ITU-T Recommendation I.320, ISDN Protocol Reference Model[8]

ITU-T Recommendation I.460, Multiplexing, Rate Adaption, and Support of Existing Interfaces[8]

ITU-T Recommendation X-25, Interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for Terminals Operating in the Packet Mode and Connected to Public Data Networks by Dedicated Circuit[8]

ITU-T Recommendation X.200, Reference Model of Open Systems Interconnection for ITU-T Applications[8]

ITU-T Recommendation X.210, Open Systems Interconnection (OSI) Layer Services Definition Conventions[8]

2.3 Related Standards.

The standards listed here are for information only and are not essential for completion of this standard:

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[2] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005 < https://www.atis.org/docstore/product.aspx?id=25275>

[3] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005 < https://www.atis.org/docstore/product.aspx?id=24726>

[4] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005 < https://www.atis.org/docstore/product.aspx?id=25276>

[5] This document is available from the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005 < https://www.atis.org/docstore/product.aspx?id=24729>

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[7] This document is available from the International Telecommunications Union. < http://www.itu.int/ITU-T/ >

ITU-T Recommendation X.2, International Data Transmission Services Optional Facilities in Public Data Networks[8]

ITU-T Recommendation X.21, Interface between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) for Synchronous Operation on Poblic Data Networks[8]

3 Definitions

3.1 International Telegraph and Telephone Consultative Committee (ITU-T). International Telegraph and Telephone Consultative Committee (ITU-T) is one of the seven organizations of the International Telecommunication Union (ITU), a specialized agency of the United Nations since 1948 and an international treaty organization. The ITU traces its formal beginnings to 1865. ITU-T has responsibility for the development of telecommunications standards in the ITU and consisted of fifteen study groups in the 1981-1984 study period. The general purpose of the ITU-T is to promote and ensure the operations of international telecommunications systems.

3.2 Integrated Services Digital Network (ISDN). A network, in general evolving from an existing telephony network, that provides end-to-end digital connectivity to support a wide range of both voice and nonvoice services. User access to an ISDN is via a limited set of standard multipurpose interfaces.

3.3 D Channel. A 16-kbit/s channel carrying control or signaling information and, optionally, packet- ized information and telemetry on the remaining capacity.

3.4 B Channel. A 64-kbit/s channel that carries user information such as voice calls, circuit-switched data, or packet-switched data. To support the packet bearer service defined in this standard, a B channel shall carry protocols at Layer 2 and 3 in accordance with ITU-T Recommendation X.25.

3.5 Layered Protocol. The protocol reference model is defined by layered structures based on and using the terminology of ITU-T Recommendations X.200 and X.210. The protocols referred to in this American National Standard conform to the reference model for ISDN specified in ITU-T Recommendation !.320. The ISDN reference model divides a protocol into seven layers; however, for the support of the minimal set of bearer services, only the first three layers are required. Layers 1 through 3 provide the following functions:

(1) *Layer I (The Physical Layer).* Layer 1 provides the mechanical, electrical, functional, and procedural characteristics to activate, maintain, and deactivate a physical circuit. Layer 1 allows for the transparent transmission of bits to the connecting medium.

(2) *Layer 2 (The Data Link Layer).* Layer 2 provides relatively error-free transmission of data between the ends of a physical link. Layer 2 defines the procedures required to establish, maintain, and dis- connect the data link.

(3) *Layer 3 (The Network Layer)*. Layer 3 provides the means to establish, maintain, and release network connections between application entities. Layer 3 provides the procedures for the exchange of messages between the user and its serving network equipment over the D channel.

3.6 Throughput. The throughput for any virtual connection is the number of user data bits success- fully transferred in one direction across that connection per unit time. Successful transfer means that no user data bits are lost, added, or inverted in transfer.

3.7 Information Transfer Mode. This attribute de- scribes the operational mode for transferring (transportation and switching) user information through the ISDN. It can be used to characterize a telecommunication service or a connection in the network. Values associated with this attribute are circuit mode and packet mode.

3.8 Information Transfer Rate. This attribute de- scribes either the bit rate (circuit mode) or the throughput (packet mode). It refers to the transfer of digital information between two access points or reference points. Values associated with this attribute are appropriate bit rate and throughput rate.

3.9 Information Transfer Capability. This attribute describes the capability associated with the transfer of different types of information through the ISDN. It can be used to characterize a telecommunication service or connection. Values associated with this attribute are unrestricted digital, speech, 3.1-kHz audio, 7-kHz audio, 15-kHz audio, and video.

3.10 Communication Configuration. This attribute describe-s the special arrangement for transferring information between two or more access points. It completes the structure associated with a telecommunication service as it associates the relationship between the access points involved and the flow of information between these access points. Values associated with this attribute are point-to- point, multipoint, and broadcast.

3.11 Structure. This attribute refers to the capability of the ISDN to deliver the information to the destination access point or reference point in a structure (e.g., time interval for circuit-mode, service data unit for packet-mode) that was presented in a corresponding signal structured at the origin (access point or reference point). Values associated with this attribute are 8-kHz integrity, service data unit integrity, and unstructured.

3.12 Establishment of Communication. This at- tribute, associated with a telecommunication service, describes the mode of establishment used to establish and release a given communication. Values associated with this attribute are demand, reserved, and permanent.

3.13 Symmetry. This attribute describes the relationship of information flow between two (or more) access points or reference points involved in a communication. It characterizes the structure associated with a telecommunication service or a connection. Values associated with this attribute are unidirectional, bidirectional symmetric, and bidirectional asymmetric.

3.14 Channel and Rate. This attribute describes the channels and their bit rate used to transfer the user information or the signaling information, or both, at a given access point or reference point. Values associated with this attribute are: name of the channel and the corresponding bit rate.

4 Background

ITU-T Recommendation I.211 defines bearer services in terms of three categories of attributes: information transfer attributes, access attributes, and general attributes. Each attribute has a defined set of possible attribute values.

The information transfer attributes define the transmission characteristics of connections between ISDN users at S/T reference points or between an ISDN user at a S/T reference point and an interworking point to another network. The information transfer attributes and values related to the minimal set of bearer services in this document are summarized in Table I.

The access attributes describe the means for accessing network functions or facilities as seen at one S/T reference point. The access attributes and values related to the minimal set of bearer services in this document are summarized in Table 2.

The general attributes deal with the service in general. The general attributes and values related to the minimal set of bearer services in this document are summarized in Table 3.

5 Minimal Set of Bearer Services Appropriate to the United States

The following bearer services should be provided by a public ISDN in the United States. In addition to the attribute values, explanatory statements are given for fuller understanding or each bearer service.

5.1 Circuit-Mode Digital (CMD).

Tables 4 through 6 summarize the information transfer attributes, access attributes, and general attributes associated with this bearer service.

For this circuit-mode digital bearer service with capability attribute value "unrestricted," the essential characteristic is that the received bit stream is identical (within performance limitations) to the transmitted stream including network-provided octet framing at the user-network interface. μ.-law to A-law conversion would not be provided at the internetwork points between μ -law and A-law countries. The actual application is controlled by user equipment at each end and could thus, in principle, transport voice, rate-adapted and non-rate-adapted circuit-mode data, packet-mode data, and the like. In the United States, the need for a minimum ones density to maintain repeater synchronization may prohibit the offering of this bearer service on other than an intra-switching- system basis by some networks for migration period. The introduction of new transmission techniques will remove this limitation.

Requests for this bearer service that result in interworking with other ISDNs, a CSPDN, a PSPDN, a CSPDN access line, or a PSPDN access line will be accepted. The interworking function includes signaling protocol interfacing.

To interwork with digital networks having a maximum of 56-kbit/s transport capability, ISDNs may require selection of a 56-kbit/s rate adaptation by the user in the call request.

During an interim period when domestic networks may have a restriction against transmission of the all-zero octet, the capability attribute value "restricted" identifies that service constraint.

Circuit-mode rate adaptation by user equipment from a lower rate (e.g., 4.8, 56 kbit/s) to 64 kbit/s is defined in ITU-T Recommendation I.460 and ensures that the all-zero octet is not transmitted by requiring at least one bit of each octet to be a binary one.

To guard against inadvertent transmission of the all-zero octet by user equipment, the network may continuously monitor for this condition. When the all-zero octet is detected it may be altered. Eventually, the universal availability of new transmission methods will eliminate this restriction and these restricted bearer capabilities could be eliminated.

5.2 Circuit-Mode Speech (CV).

Tables 7 through 9 summarize the information transfer attributes, access attributes, and general attributes associated with this bearer service.

For the speech-bearer service, the network assumes that μ-law--encoded speech, as described in ITU-T Recommendation G.711, is present at the user-network interface. The network provides octet framing at the user-network interface. The essential characteristic here is that the ISDN may employ processing techniques appropriate for speech that do not assure bit integrity. μ-law to A-law conversion would be provided, as appropriate, between net- works. Performance of voiceband modems is not guaranteed. When connections involving ISDN trunks are required, means for guarding against inadvertent transmission of the all-zero octet by user equipment may be provided by the network.

Requests for this bearer service will be accepted both between ISDN users and for interworking with another ISDN, a PSTN, or a PSTN access line. The interworking function includes signaling protocol interfacing.

5.3 Circuit-Mode Voiceband Data (CVBD).

Information transfer attribute values are identical to circuit-mode speech, except that the information transfer capability attribute value is "3.1-kHz audio." Access attribute values are identical to circuit mode speech.

General attribute values are identical to circuit- mode speech.

For the 3.1-kHz audio bearer service, the network assumes that μ-law encoded, band-limited, audio information is present at the user-network interface. The use of voiceband modems, including those specified in the V Series, and group I, II, and III facsimile is intended. The network provides octet framing at the user-network interface. In the ISDN, some transmission processes specific to speech may be prohibited; however, analog transmission may be permitted.

μ-law to A-law conversion may be provided as appropriate between networks. Thus, bit integrity is not assured. When connections involving ISDN trunks are required, means for guarding against inadvertent transmission of the all-zero octet by user equipment may be provided by the network.

Requests for this bearer service will be accepted both between ISDN users and for interworking with another ISDN, a PSTN, or a PSTN access line. The interworking function includes signaling protocol interfacing.

5.4 Packet-Mode Data (PMD).

Tables 10 through 12 summarize the information transfer attributes, access attributes, and general attributes associated with this bearer service.

This bearer service provides transfer of user information in a packetized manner over a virtual circuit within a B or D channel at the S/T reference point.

For a virtual call on a B channel, if a permanent connection from a B channel to a Packet Handling function has not been established, D-channel signaling procedures may be used to connect a B channel to a Packet Handling function. (Subscription to either on-demand or permanent B channel access to a Packet Handling function is a user option.) Once connected to a Packet Handling function, the user provides remaining call info1mation according to Layer-3 procedures, as specified in ITU-T Recommendation X.25.

For a virtual call on a D channel, the call is originated by the user according to Layer-3 procedures, as specified in ITU-T Recommendation X.25.

Table 1 - Information Transfer Attributes and Values

Attribute Name	Attribute Values
Information transfer mode	Circuit, packet
Information transfer rate	64 kbit/s (circuit-mode) throughput values (packet-mode)
Information transfer capability	Unrestricted digital, speech, 3.1-kHz audio
Structure	8-kHz integrity, service-data-unit integrity
Establishment of communication	Demand, permanent
Communication configuration	Point-to-point
Symmetry	Bidirectional symmetric

Table 2 - Access Attributes and Values

Attribute Name	Attribute Values
Signaling	
Channel and rate	D channel at 16 kbit/s B channel at 64 kbit/s
Protocol	
Layer 1	See Note 1
Layer 2	LAPD, as specified in ANSI T1.602-1989 LAPB, as specified in CCITT Recommendation X.25
Layer 3	D channel Layer 3, as specified in ANSI T1.607 and T1.608 X.25 Layer 3, as specified in CCITT Recommendation X.25
Information Transfer	
Channel and rate	D channel at 16 kbit/s B channel at 64 kbit/s
Protocol	
Layer 1	See Note 1
Layer 2	LAPD, as specified in ANSI T1.602-1989 LAPB, as specified in CCITT Recommendation X.25
Layer 3	Layer 3, as specified in CCITT Recommendation X.25
Speech Encoding	μ-law, as specified in CCITT Recommendation G.711, transparent (Note 2)

NOTES:

(1) The Layer 1 protocol and format that provides for these channels is given in ANSI T1.601-1988 and T1.605-1989.

(2) The application is controlled by user equipment and could thus, in principle, transport voice, high or low-bit-rate data, packet-mode data, and the like.

Table 3 - General Attributes

Attribute Name	Attribute Values
Supplementary services	To be the subject of other American National Standards
Quality of service	To be the subject of other American National Standards
Interworking possibilities with other networks	Notes 1 and 2
Operational aspects	Operational aspects are to be the subject of other American National Standards.
Commercial aspects	Commercial aspects are not within the scope of this standard.

NOTES:

(1) With regard to "interworking," it should be noted that the user does not specifically request interworking. The network identifies an interworking situation with another network in the process of establishing a call based on the specified bearer service, or the called party number, or both. At that time, the call may be rejected because of incompatible transmission or signaling characteristics. The transmission characteristics of an interworking call depend on the transmission characteristics of the ISDN and of the connected network.

(2) Interworking possibilities are listed for this attribute. The listing of an interworking possibility does not necessarily mean every public ISDN has operational interworking arrangements of these types. Rather, such interworking is a technical possibility that should not be precluded by this or related standards. The existence of an actual interworking capability between two particular networks is also dependent on other factors (e.g., technical, business, and regulatory) that are beyond the scope of this standard.

(3) Additional attribute values are under study.

Table 4 - Information Transfer Attributes- Circuit-Mode Digital

Attribute Name	Attribute Value
Information transfer mode	Circuit
Information transfer rate	64-kbit/s
Information transfer capability	Unrestricted digital (See Note)
Structure	8-kHz integrity
Establishment of communication	Demand
Communication configuration	Point-to-point
Symmetry	Bidirectional symmetric

NOTE: During a migration period, some 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.

Table 5 - Access Attributes- Circuit-Mode Digital

Attribute Name	Attribute Values
Signaling	
Channel and rate	D channel at 16 kbit/s
Protocol	
Layer 2	LAPD, as specified in ANSI T1.602-1989
Layer 3	D-channel Layer 3, as specified in ANSI T1.607
Information Transfer	
Channel and rate	B channel at 64 kbit/s
Protocol	Transparent (see Note)

NOTE: The application is controlled by user equipment and could thus, in principle, transport voice, rate-adapted or non-rate-adapted circuit-mode data, packet-mode data, and the like.

Table 6 - General Attributes- Circuit-Mode Digital

Attribute Name	Attribute Value
Supplementary services	None included in this standard
Interworking possibilities with other networks	Other Integrated Services Digital Networks (ISDNs)
	Public Switched Telephone Network(s) (PSTN) for interworking Rate Adapted Data on the ISDN
	Packet-Switched Public Data Network(s) (PSPDN)
	Circuit-Switched Public Data Network(s) (CSPDN – Note) including those which provide 56-kbit/s transmission
	Private Networks with compatible signaling and information transfer attributes

NOTE: The term, CSPDN, as used here does not necessarily correspond to the definition used by CCITT. A CSPDN, in the United States, provides a user with a circuit-switched digital connection. Some key differences between a US CSPDN and that defined by CCITT are that (1) the numbering plan for PSTNs is used by the US CSPDNs, and (2) CCITT Recommendations X.2 and X.21 are not supported by the US CSPDNs.

Table 7 - Information Transfer Attributes- Circuit-Mode Speech

Attribute Name	Attribute Values
Information transfer mode	Circuit
Information transfer rate	64 kbit/s
Information transfer capability	Speech
Structure	8-kHz integrity
Establishment of communication	Demand
Communication configuration	Point-to-point
Symmetry	Bidirectional symmetric

Table 8 - Access Attributes- Circuit-Mode Speech

Attribute Name	Attribute Values
Signaling	
Channel and rate	D channel at 16 kbit/s
Protocol	
Layer 2	LAPD, as specified in ANSI T1.602-1989
Layer 3	D-channel Layer 3, as specified in ANSI T1.607
Information Transfer	
Channel and rate	B channel at 64 kbit/s
Protocol	μ-law PCM, as specified in CCITT Recommendation G.711

Table 9 - General Attributes- Circuit-Mode Speech

Attribute Name	Attribute Value
Supplementary services	None included in this standard
Interworking possibilities with other networks	Other Integrated Services Digital Networks (ISDNs)
	Public Switched Telephone Network(s) (PSTN)
	Private networks with compatible signaling and information transfer

Table 10 - Information Transfer Attributes- Packet-Mode Data

Attribute Name	Attribute Value
Information transfer mode	Packet
Information transfer rate	Throughput (see Note)
Information transfer capability	Unrestricted digital
Structure	Service data unit integrity
Establishment of communication	Demand, permanent
Communication configuration	Point-to-point
Symmetry	Bidirectional symmetric

NOTE: The packet-mode bearer service provides for the transparent transfer of user information in a packetized manner over a virtual circuit within a packet-mode channel at the user–network interface. The maximum throughput of a given virtual circuit is less than or equal to the smaller of (1) the bit rate of the user information access channel (16-kbit/s D channel or 64-kbit/s B channel); and (2) the throughput class of the virtual circuit.

Table 11 - Access Attributes- Packet-Mode Data

Attribute Name	Attribute Value	
	D Channel	B Channel
Signaling		
Physical channel control	(see Note 1)	(see Note 2)
Channel and rate	D channel, 16 kbit/s	D channel, 16 kbit/s
Protocol		
Layer 2	LAPD, as specified in ANSI T1.602-1989	LAPD, as specified in ANSI T1.602-1989
Layer 3	D-channel Layer 3, as specified in ANSI T1.607	D-channel Layer 3, as specified in ANSI T1.607
Virtual Call Control		
Channel and rate	D channel, 16 kbit/s	B channel, 64 kbit/s
Protocol		
Layer 2	LAPD, as specified in ANSI T1.602-1989	LAPB, as specified in CCITT Recommendation X.25
Layer 3	X.25 Layer 3, as specified in ANSI T1.608 and CCITT Recommendation X.25	X.25 Layer 3, as specified in ANSI T1.608 and CCITT Recommendation X.25
Information Transfer		
Channel and rate	D channel, 16 kbit/s	B channel, 64 kbit/s
Protocol		
Layer 2	LAPD, as specified in ANSI T1.602-1989	LAPB, as specified in CCITT Recommendation X.25
Layer 3	Layer 3, as specified in CCITT Recommendation X.25	Layer 3, as specified in CCITT Recommendation X.25

NOTES:
(1) The D Channel provides a semipermanent physical connection (while the ISDN access is powered up) that enables the ISDN user terminal to access a Packet Handling function within the ISDN by establishing a link layer connection to that function that can then be used to support packet communication according to X.25 Layer-3 procedures. Thus, for outgoing calls, no physical channel control procedures are needed. For incoming calls, the Layer-3 channel negotiation procedures may be used to determine the channel upon which the call will be received.
(2) Physical channel control is not required for semipermanent connections.

Table 12 - General Attributes- Packet-Mode Data

Attribute Name	Attribute Value
Supplementary services	None included in this standard.
Interworking possibilities with other networks	Other Integrated Services Digital Networks
	Public Switched Telephone Network(s) (PSTN)
	Packet-Switched Public Data Network(s) (PSPDN)
	Circuit-Switched Public Data Network(s) (CSPDN), including those that provide 56-kbit/s transmission
	Private networks with compatible signaling and information transfer attributes