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INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

SERVICE CAPABILITIES

BEARER SERVICES SUPPORTED BY AN ISDN

CIRCUIT MODE 64 kbit/s 8 kHz STRUCTURED MULTI-USE BEARER SERVICE CATEGORY

ITU-T Recommendation I.231.9

(Previously "CCITT Recommendation")

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation I.231.9 was prepared by the ITU-T Study Group I (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation I.231.9

CIRCUIT MODE 64 KBIT/S 8 KHZ STRUCTURED MULTI-USE BEARER SERVICE CATEGORY

(Helsinki, 1993)

1 Definition

This bearer service category provides the transfer of circuit mode 64 kbit/s unrestricted digital information between multi-use terminals (e.g. 7 kHz audio terminals, videophones, or G4/G3 fax machines). As a network option, it also provides for interworking to ISDN speech or 3.1 kHz audio terminals, and interworking to PSTN, if the calling user requests that interworking be allowed to an alternate service, i.e. speech or 3.1 kHz audio.

2 Description

2.1 General description

This circuit mode bearer service category allows:

– two users (e.g. terminals, PABXs) in a point-to-point configuration to communicate via the ISDN using 64 kbit/s unrestricted digital signals, or encoded speech or 3.1 kHz audio information over the B-channel in both directions continuously and simultaneously for the duration of a call;

– three or more users in a multipoint configuration as provided by supplementary services, for example, conference calling.

Tones and/or announcements to indicate the progress or otherwise of a call, are provided by the network. Tones and announcements will be provided in accordance with Recommendation G.711.

2.2 Specific terminology

For the purposes of this Recommendation, the following definition apply.

retention timer: This timer specifies the amount of time that the network retains the call information of the original call upon encountering busy or being released. This timer is a network provider option. The value for this timer is greater than 15 seconds.

3 Procedures

3.1 Provision/withdrawal

3.1.1 Provision of this service will be by prearrangement with the Administration.

3.1.2 This bearer service is offered with several subscription options which apply separately to each ISDN number or group of ISDN numbers on the interface. For each subscription option, only one value can be selected. Subscription options for the interface are summarized below:

Subscription option	Value
Maximum number of information channels available at user B	– *m*, where *m* is not greater than the number of information channels on the interface
Maximum number of total calls present at user B	– *n*, where *n* is not greater than the number of information channels on the interface

User B can be an ISDN number or group of ISDN numbers on the interface.

NOTE – More than one ISDN number can be associated with the service/interface only as a part of a supplementary service such as multiple subscriber number. In the case of one ISDN number, the option given above for the number of calls can only exceed the number of information channels in association with a supplementary service (e.g. call waiting). As a network provider option, separate values may be specified for incoming and for outgoing calls for either or both of the limits.

3.2 Normal procedures

Out-of-band messages shall be provided to indicate call progress, etc., together with network-generated in-band tones and announcements where applicable.

If a call is established to a multi-use terminal, the network shall provide unrestricted information transfer. If a call is established to a speech terminal, the network shall provide a connection capable of supporting speech information transfer. If a call is established to a 3.1 kHz audio terminal, the network shall provide a connection capable of supporting 3.1 kHz audio information transfer. If a call interworks to the PSTN, the network shall provide a connection capable of supporting the alternate service requested (speech or 3.1 kHz audio). In each of these latter three cases, the user signal shall conform to G.711 for the remainder of the call (see Note).

NOTE – Supporting speech or 3.1 kHz audio information transfer implies providing functions such as echo control and μ/A-law conversion when they are required.

When the user requests a fall-back, the network performs the fall-back. In this case the user has to indicate a combination of information transfer capability explicitly as follows:

i) UDI-TA/speech (e.g. telephony);

ii) UDI-TA/3.1 kHz audio (e.g. fax);

iii) others are for further study.

Interworking for this service may be provided as a network option. If interworking is required to establish a call, and the destination network does not support this interworking, the call is cleared by the destination network. A call is cleared when the network does not provide this service and the calling user has not requested that interworking be allowed as described below.

a) *Originating the service (call set-up)*

The call is originated by the user requesting the required bearer service. This request shall include a number identifying the called user. Other information as required, and other information which may be required for use by the network in supplementary services provided to the user (e.g. calling line identity) may also be included.

This request may be given to the network either en block, containing all the required information, or not en bloc.

The calling user may request that interworking be allowed to the PSTN, ISDN speech or 3.1 kHz audio terminals by including an alternate service request for speech or 3.1 kHz audio. The network shall not allow interworking without this request.

b) *Indications during call set-up*

All indications entail signalling messages, and may also include in-band tones or announcements.

After initiating a call the calling user will receive an acknowledgement that the network is able to process the call. The called user will receive an indication of the arrival of an incoming call of this bearer service. If the calling user indicates that fall-back is allowed, then the call will be presented to all terminals capable of supporting one or both of the requested information transfer capabilities. If the called user does not subscribe to this bearer service or the user does not support the primary information transfer capability, but does support the fall-back information transfer capability, then the call should be offered to the called user using the fall-back information transfer capability.

The calling user shall also be given an indication that the incoming call is being offered to the called user, when an indication is received by the network that the called user is being informed of this call. If fall-back has been requested, the called user can accept the call at any terminal where the call is offered. In addition, the called user can accept the call using either information transfer capability on terminals supporting both information transfer capabilities. If fall-back was requested, the calling user will be informed of the information transfer capability of the resulting call.

The called user may also provide other information, for use by the network in supplementary services provided to other users (e.g. connected line identify). The relationship of a connected user with a called user requires further study.

Once established, the B-channel is available for the transmission of signals in both directions continuously and simultaneously.

c) *Terminating the call*

The call may be terminated by either or both of the users by indicating this to the network. If one user terminates a call, an appropriate indication is sent to the other user.

3.3 Exceptional procedures

a) *Failure situations due to user error*

i) A user inputting a network-identifiable, improper service request will be given an appropriate failure indication by the network and the call set-up will be ceased.

ii) A user inputting a non-valid network number will be given an appropriate failure indication by the network and the call set-up will be ceased.

b) *Failure situation due to called user state*

i) A calling user attempting to establish a call is a user who is identified by the network to be busy (either network-determined user busy or user-determined user busy) will be given an appropriate failure indication by the network.

ii) A user attempting to establish a call to a user whose terminal equipment fails to respond will be given an appropriate failure indication by the network and the call set-up will be ceased.

iii) On a call to a user whose terminal equipment has responded that the called user is being informed of the call but has failed to answer within a defined period of time, the calling user attempting to establish the call will be given an appropriate failure indication by the network and the call set-up will be ceased.

c) *Failure situation due to network conditions*

i) A user attempting to establish a call but meeting call failure situation due to network conditions (e.g. congestion) will be given an appropriate failure indication by the network.

d) *Failure situations due to called user state and/or network conditions*

i) A user attempting to establish a call but meeting call failure situations due to network conditions (e.g. congestion) or called user state (e.g. busy) can have service data retained for a specified period of time, i.e. retention timer.

3.4 Alternative procedures

3.4.1 Reserved service procedures

For further study.

3.4.2 Permanent service procedures

For further study.

4 Network capabilities for charging

This Recommendation does not cover charging principles. Future Recommendations in the D-Series are expected to contain that information. It shall be possible to charge the subscriber accurately for this service.

4.1 Demand service charging

It shall be possible to charge the subscriber accurately for the demand service.

4.2 Reserved service charging

It shall be possible to charge the subscriber accurately for the reserved service.

4.3 Permanent service charging

It shall be possible to charge the subscriber accurately for the permanent service.

5 Interworking requirements

In the case where interworking is provided as a network option, the following requirements apply.

5.1 Interworking with public networks

If a call requesting this service category with interworking to speech or 3.1 kHz audio allowed encounters PSTN interworking, the network will allow the call to proceed as if it were a speech or 3.1 kHz audio call, depending on which alternate service was requested. Normal interworking arrangements between the PSTN and ISDN for speech and 3.1 kHz audio calls will apply. Interworking information for PSTN interworking shall be provided to the calling interface. The network shall perform all necessary functions to support the alternative service (see Note). If fall-back occurs due to interworking, the calling user should be informed.

NOTE – Supporting speech or 3.1 kHz audio information transfer implies providing functions such as echo control and μ/A-law conversion when they are required.

When a call requesting this service category with interworking to speech or 3.1 kHz audio allowed arrives at an ISDN destination interface the call should be offered such that a speech or 3.1 kHz audio terminal may also accept the call, depending on which alternate service was requested. (This covers the case where the multi-use service is not subscribed, or a multi-use terminal may not be available, but speech or 3.1 kHz audio communication is still possible.) If a speech terminal accepts the call, an indication should be returned to the caller that the call is a speech call. The network shall perform all necessary functions to support the alternative service (see Note). If a 3.1 kHz audio terminal accepts the call, an indication should be returned to the caller that the call is a 3.1 kHz audio call.

If a call requesting this service category with interworking not allowed encounters PSTN interworking or arrives at an access which does not subscribe to the multi-use service, the call shall be cleared.

5.2 Interworking with private ISDNs

If the called user is on a private ISDN, the fall-back procedures will be performed by the private ISDN.

The result of call presentation within the private ISDN (i.e. which information transfer capability results) will be indicated to the public ISDN.

6 Interaction with supplementary services

For further study.

7 Attributes and values of attributes (including the provision of individual bearer services)

7.1 Attributes and values of attributes of the circuit-mode 64 kbit/s 8 kHz structured multi-use bearer service category

Information transfer attributes

1)	Information transfer mode:	circuit
2)	Information transfer rate:	64 kbit/s
3)	Information transfer capability:	UDI-TA/Speech, UDI-TA/3.1 kHz audio [unrestricted digital information with jones/announcements (UDI-TA)] Others are for further study.
4)	Structure:	8 kHz integrity
5)	Establishment of communication:	demand/reserved/permanent
6)	Symmetry:	bidirectional symmetric/unidirectional
7)	Communication configuration:	point-to-point/multipoint

Access attributes

8)	Access channel:	B for user information, D for signalling and/or operational administrative and maintenance (OAM) messages
9)	Access protocol	
9.1)	I.430/I.431	
9.2)	I.440/I.441	
9.3)	I.450/I.451	
9.4)	G.722/G.725	
9.5)	For further study	
9.6)	For further study	

General attributes

10)	Supplementary services provided:	for further study
11)	Quality of Service:	for further study
12)	Interworking possibilities:	for further study
13)	Operation and commercial aspects:	for further study

7.2 Provision for individual bearer services

In the following table the provision of individual circuit-mode 64 kbit/s 8 kHz structured bearer services usable for multi-use information transfer is given. The definition of the E (essential) and A (additional) can be found in Recommendation I.230.

a) Overall provision: A

b) Variations of secondary attributes:

	Establishment	Symmetry	Communication	Provision
I.231.x/1	demand		pt-pt	E
I.231.x/2	reserved	Bidirectional	pt-pt	A
I.231.x/3	permanent		pt-pt	E
I.231.x/4	demand		pt-pt	A
I.231.x/5	reserved	Unidirectional	pt-pt	A
I.231.x/6	permanent		pt-pt	A
I.231.x/7	demand		Multipt	A
I.231.x/8	reserved	Bidirectional	Multipt	A
I.231.x/9	permanent		Multipt	A
I.231.x/10	demand		Multipt	A
I.231.x/11	reserved	Unidirectional	Multipt	A
I.231.x/12	permanent		Multipt	A

c) Access

Signalling and OAM (Note 1)		User information		Provision
Channel and rate	Protocols	Channel and rate	Protocols	
D(16)	Q.931 (Note 2)	B(64)	G.722/G.725/G.711 H.221/H.242/H.230 (Notes 3, 4)	E
D(64)	Q.931 (Note 2)	B(64)	G.722/G.725/G.711 H.221/H.242/H.230 (Notes 3, 4)	E

NOTES

1 Definition of protocols for OAM is for further study.

2 Demand service only. Further study for reserved and permanent services.

3 If interworking to speech, 3.1 kHz audio, or PSTN occurs.

4 Additional protocols are for further study.

8 Dynamic description

The dynamic description for this service on a demand basis, with the exception of the fallback procedures, is defined as for a number of circuit mode services and is therefore collectively given in Recommendation I.220.