Recommendation I.231 - Circuit-mode bearer service categories

1. General

Recommendation I.210 describes the principles for defining telecommunication services supported by an ISDN including the concept of bearer services, teleservices and supplementary services. It also provides the means for the definition and description of such services. A recommended set of circuit-mode bearer services categories is defined in Recommendation I.230.

The purpose of this Recommendation is to describe circuit-mode bearer services categories, to describe individual circuit-mode bearer services, and to recommend their provision in ISDN. The definitions and descriptions form the basis to define the network capabilities required for the support of the services in ISDN.

Bearer service categories are described by prose definitions and descriptions, by attributes and their values and by dynamic descriptions following the description method given in Recommendation I.130. The application of the attribute technique and the definitions of these attributes and attribute values is given in Recommendation I.140.

The following set of bearer services categories is currently identified and more may be identified in the future.

I.231.1 Circuit-mode 64 kbit/s unrestricted 8 kHz structured bearer service category

I.231.2 Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for speech information transfer

I.231.3 Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for 3.1 kHz audio information transfer

I.231.4 Circuit-mode alternate speech / 64 kbit/s unrestricted 8 kHz structured bearer service category

I.231.5 Circuit-mode 2 x 64 kbit/s unrestricted 8 kHz structured bearer service category

I.231.6 Circuit-mode 384 kbit/s unrestricted 8 kHz structured bearer service category

I.231.7 Circuit-mode 1536 kbit/s unrestricted 8 kHz structured bearer service category

I.231.8 Circuit-mode 1920 kbit/s unrestricted 8 kHz structured bearer service category

I.231.1 - Circuit-mode 64 kbit/s unrestricted 8 kHz structured bearer service category (Note 1)

1. Definition

This bearer service category provides unrestricted information transfer between S/T reference points, it may, therefore, be used to support various user applications. Examples include:

1) speech (Note 2);

2) 3.1 kHz audio (Note 2);

3) multiple subrate information streams multiplexed into 64 kbit/s by the user;

4) transparent access to an X.25 public network (I.462 case a).

User information is transferred over a B channel, signalling is provided over a D channel.

Note 1 - During an interim 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. For interworking the rules given in the Appendix of Recommendation I.520 should apply. The interworking functions have to be provided in the network with restricted 64 kbit/s capability. The ISDN with 64 kbit/s transfer capabilities will not be affected by this interworking other than by conveying the appropriate signalling message to and from the ISDN terminal.

Note 2 - Whilst speech and 3.1 kHz audio have been given as applications for this bearer service category, it is recognized that it is the responsibility of the customers to ensure that a compatible encoding scheme is in operation. Customers should also recognize that 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 will indicate the suitability of a particular version of this bearer service for speech.

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 digital signals over the B channel, in both directions continuously and simultaneously for the duration of call;

- three or more users in a multipoint configuration (refer to Recommendation I.254 for the supplementary service description on 3-party calling and conference calling).

2.2 Specific terminology

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 pre-arrangement with the administration/RPOA.

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

All user-network signalling is done on the D channel.

a) Originating the service (call set-up)

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

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

b) Indications during call set-up

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.

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. When the call reaches the called user and the connection is established, an indication of this is sent to the calling user.

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

Once established, the B channel is then available for the transmission of 64 kbit/s digital signals in both directions continuously and simultaneously. Without alteration by the network. No restriction is placed by the network on the content of the digital signals (see Note 1).

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 the 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 situations due to called user state

i) A calling user attempting to establish a call to 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 where 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 situations due to network conditions

i) A user attempting to establish a call but meeting call failure situations 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.

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

Interworking between the ISDN and networks referred to as "digital PSTNs", pre ISDNs, pilot ISDNs or extended IDNs as well as between the ISDN and PSTNs may be required for this bearer service category.

In advance of the provision of the ISDN, similar services supported by 64 kbit/s connectivity will be available to customers by RPOAs/network operators on what may be described as "digital PSTNs", pre ISDNs, pilot ISDNs or extended IDNs. Interworking with ISDN customers will therefore be required. To effect this, as a broad guideline, RPOAs/network operators need to ensure these networks have the necessary functionality at the interworking point to provide service connectivity with the ISDN.

A V-Series terminal connected to the ISDN via a terminal adaptor and using the 64 kbit/s unrestricted bearer service requires the use of an IWF (including a modem) in the network for calls to PSTN users. To effect the connection, a 64 kbit/s connection would need to be used to the IWF and a 3.1 kHz audio or equivalent connection would then need to be used to the PSTN user.

6. Interaction with supplementary services

Not applicable. Each supplementary service description identifies the applicability to this bearer service category.

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 unrestricted 8 kHz structured bearer service category

Attributes/Values

Information transfer attributes

1) Information transfer mode : Circuit

2) Information transfer rate : 64 kbit/s

3) Information transfer capability : unrestricted

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 (Note 1)

9) Access protocol : I-Series for D channel

Note 1 - For reserved/permanent service the operational administrative and maintenance messages (OAM) related to these services may be conveyed over the D channel.

General attributes

10) Supplementary services provided refer to I.250

11) Quality of service

12) Interworking possibilities for further study

13) Operational and commercial aspects

7.2 Provision of individual bearer services

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

a) overall provision: E

b) variations of secondary attributes

	establishment of communication	symmetry	communication configuration	provision
I.231.1/1	demand		pt-pt	E
I.231.1/2	reserved	bidirectional	pt-pt	A
I.231.1/3	permanent		pt-pt	E
I.231.1/4	demand		pt-pt	A
I.231.1/5	reserved	unidirectional	pt-pt	A
I.231.1/6	permanent		pt-pt	A
I.231.1/7	demand		multipt	A

I.231.1/8 reserved	⇊	bidirectional	multipt	A
I.231.1/9 permanent	⇊		multipt	A
I.231.1/10 demand	⇊		multipt	A
I.231.1/11 reserved	⇊	unidirectional	multipt	A
I.231.1/12 permanent	⇊		multipt	A

c) access

signalling & OAM		user information		
(Note 2)				
channel & rate	protocols	channel & rate	protocols	provision
D(16)	I.451 (Note 1)	B(64)	user-defined	E
D(64)	I.451 (Note 1)	B(64)	user-defined	E

Note 1 - Demand services only FS for reserved and permanent services.

Note 2 - Definition of protocols for OAM is for further study.

8. Dynamic description

The dynamic description for this service on a demand basis is identical for a number of circuit-mode services and is therefore collectively given in Recommentation I.220.

I.231.2 - Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for speech information transfer

1. Definition

This bearer service category is intended to support speech.

The digital signal at the S/T reference point shall conform to Recommendation G.711 (A-law or μ-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 is not intended to support modem derived voice band data.

All CCITT Recommendations for the transfer of speech information in the network apply to this service.

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 speech encoding into 64 kbit/s digital signals over the B channel, in both directions continuously and simultaneously for

the duration of a call;

- three or more users in a multipoint configuration (refer to Recommendation I.254 for the supplementary service description for 3-party calling and conference calling).

Tones and/or announcements to indicate the progress or otherwise of a call, are provided by the network.

2.2 Specific terminology

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 pre-arrangement with the administration/RPOA.

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 always be provided to indicate call progress, etc. However, network-generated in-band tones and announcements shall always be provided for this bearer service.

a) Originating the service (call set-up)

The call is originated by the user requesting the required bearer service with this request including a number identifying the called user. Other information, as required and other information which may be required for use by the

network in the supplementary service provided to the called user (e.g. calling line identity) may also be included.

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

b) Indications during call set-up

All indications entail signalling messages and shall include, where appropriate, 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.

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. When the call reaches the called user and the connection is established, an indication of this is sent to the calling user.

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

Once established, the B channel is then available for the transmission of speech 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 the 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 situations due to called user state

i) A calling user attempting to establish a call to 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 situations due to network conditions

i) A user attempting to establish a call but meeting call failure situations 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.

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 considerations

Interworking is required between the ISDN and the PSTN for this bearer service category.

6. Interaction with supplementary services

Not applicable. Each supplementary service description indentifies the applicability with this bearer service category.

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 bearer service category usable for speech information transfer

Information transfer attributes

1) Information transfer mode : Circuit

2) Information transfer rate : 64 kbit/s

3) Information transfer capability : Speech (encoded)
according to G.711 A-law μ-law) (Note 1)

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 (Note 2)

9) Access protocol : I-Series for D-channel,
G.711 for B-channel

General attributes

10) Supplementary services provided refer to I.250

11) Quality of service ⫫ for further study
⫫ (may be different from
12) Interworking possibilities ⫫ I.231A)
⫫
13) Operation and commercial aspects ⫫

Note 1 - When crossing an international boundary between administrations which employ different encoding laws the network shall perform the necessary A-μ law conversion (see Recommendation G.711).

Note 2 - For reserved/permanent service the operational administrative and maintenance messages (OAM) related to these services may be conveyed over the D channel.

7.2 Provision of individual bearer services

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

a) overall provision: E

b) variations of secondary attributes

establishment of communication	symmetry	communication configuration	provision
I.231.2/1 demand	⇊	pt-pt	E
I.231.2/2 reserved	⇊ bidirectional	pt-pt	A
I.231.2/3 permanent	⇊	pt-pt	E
I.231.2/4 demand	⇊	pt-pt	A
I.231.2/5 reserved	⇊ unidirectional	pt-pt	A
I.231.2/6 permanent	⇊	pt-pt	A
I.231.2/7 demand	⇊	multipt	A
I.231.2/8 reserved	⇊ bidirectional	multipt	A
I.231.2/9 permanent	⇊	multipt	A
I.231.2/10 demand	⇊	multipt	A
I.231.2/11 reserved	⇊ unidirectional	multipt	A
I.231.2/12 permanent	⇊	multipt	A

c) access

signalling & OAM (Note 2)		user information		
channel & rate	protocols	channel & rate	protocols	provision
D(16)	I.451 (Note 1)	B(64)	G.711	E
D(64)	I.451 (Note 1)	B(64)	G.711	E

Note 1 - Some networks will offer this service in a manner identical to the 3.1 kHz audio service.

Note 2 - Definition of protocols for OAM is for further study.

Note 3 - Demand service only. FS for reserved and permanent services.

8. Dynamic description

The dynamic description for this service on a demand basis is identical for a number of circuit mode services and is therefore collectively given in Recommentation I.220.

I.231.3 - Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for 3.1 kHz audio information transfer

1. Definition

This bearer service category corresponds to the service which is currently offered in the PSTN. This bearer service category provides for the transfer of speech and of 3.1 kHz bandwidth audio information such as voice band data via modems facsimile group 1, 2 and 3 information (Note 1). The digital signal at the S/T reference point shall conform to Recommendation G.711 (A-law or μ-law).

Connections provided for these services should offer the transfer capability for the information indicated above. (This means that the network may include speech processing techniques provided they are appropriately modified or functionally removed prior to non-speech information transfer). The control of echo control devices, speech processing devices etc., is only made by use of disabling tones (see Recommendation V.25). Bit integrity is not assured. The network may use analogue transmission.

All CCITT Recommendations for the transfer of speech information in the network apply to this bearer service category.

Note 1 - The maximum modem bit rate that can be used by users in applications of this bearer service category depends on the modulation standard employed by the user and on the transmission performance within or between different administrations. The extent of support is a network or bilaterally agreed matter.

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 3.1 kHz audio information encoding into 64 kbit/s digital signals over the B channel, in both directions continuously and simultaneously for the duration of a call;

- three or more users in a multipoint-configuration (refer to Recommendation I.254 for the supplementary service descriptions on 3-way calling and conference calling).

Tones and/or announcements to indicate the progress or otherwise of a call, are provided by the network.

2.2 Specific terminology

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 pre-arrangement with the administration/RPOA.

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 on 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 always be provided to indicate call progress, etc. However, network-generated in-band tones and announcements shall always be provided for this bearer service.

a) Originating the service (call set-up)

The call is originated by the user requesting the required bearer service with this request including a number identifying the called user. Other information, as required and other information which may be required for use by the network is 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 bloc, containing all the required information, or not en bloc.

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.

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. When the call reaches the called user and the connection is established, an indication of this is sent to the calling user.

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

Once established, the B channel is then available for the transmission of the requested (i.e., speech or 3.1 kHz audio information) signals in both directions continuously and simultaneously. Refer to the relevant D-Series Recommendations for charging aspects.

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 the 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 situations due to called user state

i) A calling user attempting to establish a call to 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 situations due to network conditions

i) A user attempting to establish a call but meeting call failure situations 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

(3293)

This Recommendation does not cover charging principles. Future Recommendations in the D-Series are expected to contain that information.

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

Interworking is required between the ISDN and the PSTN for this bearer service category.

6. Interaction with supplementary services

Not applicable. Each supplementary service description identifies the applicability to this bearer service category.

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 bearer service category usable for 3.1 kHz audio information transfer

Information transfer attributes

1) Information transfer mode : Circuit

2) Information transfer rate : 64 kbit/s

3) Information transfer capability : 3.1 kHz audio (Note 1)

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 : G.711 for B channel, I-Series for D channel

General attributes

10) Supplementary services provided refer to I.250

11) Quality of service

12) Interworking possibilities for further study

13) Operation and commercial aspects

Note 1 - When crossing an international boundary between administrations which employ different encoding laws the network shall perform the necessary A-μ law conversion (see Recommendation G.711).

7.2 Provision of individual bearer services

In the following table the provision of individual circuit-mode 64 kbit/s 8 kHz structured bearer services usable for 3.1 kHz audio information transfer is given. The definition of E (essential) and A (additional) can be found in Recommendation I.230.

a) overall provision: E

b) variations of secondary attributes

	establishment of communication	symmetry	communication configuration	provision
I.231.3/1	demand		pt-pt	E
I.231.3/2	reserved	bidirectional	pt-pt	A
I.231.3/3	permanent		pt-pt	E
I.231.3/4	demand		pt-pt	A
I.231.3/5	reserved	unidirectional	pt-pt	A
I.231.3/6	permanent		pt-pt	A
I.231.3/7	demand		multipt	A
I.231.3/8	reserved	bidirectional	multipt	A
I.231.3/9	permanent		multipt	A
I.231.3/10	demand		multipt	A
I.231.3/11	reserved	unidirectional	multipt	A
I.231.3/12	permanent		multipt	A

c) access

signalling & OAM user information (Note 1)

channel & rate	protocols	channel & rate	protocols	provision
D(16)	I.451 (Note 2)	B(64)	G.711	E
D(64)	I.451 (Note 2)	B(64)	G.711	E

Note 1 - Definition of protocols for OAM is for further study.

Note 2 - Demand services only. FS for reserved and permanent services.

8. Dynamic description

The dynamic description for this service on a demand basis is identical for a number of circuit mode services and is therefore collectively given in Recommendation I.220.

I.231.4 - Circuit-mode alternate speech / 64 kbit/s unrestricted 8 kHz structured bearer service category

1. Definition

This bearer service category provides the alternate transfer at either speech of 64 kbit/s unrestricted digital information with the same call.

The request for this alternate capability and the initial mode desired by the user must be identified at call set-up time.

This service is provided for the support of multiple capability terminals or single capability terminals.

For the speech mode of this bearer service category the same applies as for the speech bearer service category. For the unrestricted mode of this bearer service category the same applies as for the unrestricted (Note 1) bearer service category.

Note 1 - During an interim 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. For interworking the rules given in the appendix of Recommendation I.520 should apply. The interworking functions have to be provided in the network with restricted capability. The ISDN with 64 kbit/s transfer capabilities will not be affected by this interworking, other than by conveying the appropriate signalling message to or from the ISDN terminal.

Note 2 - Initially, this service will only be applicable to multiple capability terminals. The use of this service by, and the network support of single capability terminals is for further study, (e.g., how does a user change terminals). All references to single capability terminals reflect possible future enhancements and are subject to change and have only been included for information.

2. Description

2.1 General description

Once the connection is established, the user may repeatedly request via appropriate signalling messages, to

alternate from speech mode to 64 kbit/s unrestricted digital mode, or vice versa. The in-call modification shall be provided on a per call basis.

2.2 Specific terminology

None identified.

2.3 Qualifications on the applicability to telecommunications services

None identified.

3. Procedures

3.1 Provision/withdrawal

This service shall be provided by pre-arrangement with the service provider.

3.2 Normal procedures

3.2.1 Activation/deactivation/registration

Not applicable.

3.2.2 Invocation and operation

At the start of the call the request for an alternate speech/64 kbit unrestricted call and the initial mode either speech or 64 kbit unrestricted call must be identified. Following call set-up, the calling or called party may choose to modify the characteristics of the call during the conversation/data phase. During call establishment, the network shall choose a suitable route according to the information included in the set-up message.

Depending on the terminal capability type the following procedures will apply:

a) For multiple capability terminals the requesting user will send an invoke in-call modification request to the network.

b) For single capability terminals the requesting user will charge over the correction from the first terminal to the second terminal before sending an invoke in-call modification request to the network.

The network will, on receipt of the in-call modification request from the calling/called party, check if that call modification is allowed and if the necessary resources are available.

If acceptable, the resources are reserved and an invoke in-call modification request is sent to the distant end. A timer will be started to supervise that the in-call modification is received successfully.

Depending on the terminal configuration at the destination end the following procedures will occur:

a) For multiple capability terminals the distant user, if agreeing with the service change-over, will transmit a return result indication while the resources in the network are switched in if reserved and the call modification indication is sent to the initiating party.

b) For single capability terminals a call charge over will be performed from the first terminal to the second terminal. An in- call modification return result will be sent to the network which will switch in the resources if reserved previously.

3.3 Exceptional procedures

3.3.1 Activation/deactivation/registration

Not applicable.

3.3.2 Invocation and operation

If the network fails to change resources on receipt of the in-call modification return result, the connection will be cleared with a cause indication "temporary failure".

If on receipt of a call modification invocation request an exchange determines that in-call modification is not allowed or not possible a call modification return error indication will be sent. Receipt of the call modification return error indication will cause the reserved resources to be freed and a call modification return error indication to be delivered to the initiating party.

In case of in-call modification failure, the initiating terminal after having received the in-call modification return error indication will resume to transmit and receive the bit stream for the old service.

3.4 Alternative procedures

None identified.

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 the service.

5. Interworking requirements

For further study.

6. Interactions 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 alternate speech 64 kbit/s unrestricted 8 kHz structured bearer service category Attributes/Values

Information transfer attributes

1) Information transfer mode : Circuit

2) Information transfer rate : 64 kbit/s

3) Information transfer capability : Alternately speech (Note 1) or unrestricted digital information

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 (see Note 2)
9) Access protocol : I-Series for D channel

General attributes

10) Supplementary services provided
11) Quality of service (see Note 3)
for further study
12) Interworking possibilities
13) Operation and commercial aspects

Note 1 - When crossing an international boundary between administrations which employ different encoding laws the network shall perform the necessary A-μ law conversion (see Recommendation G.711).

Note 2 - For reserved/permanent service the operational administrative and maintenance messages (OAM) related to these services may be conveyed over the
D channel.

Note 3 - A short service change over time (with a high probability of not being exceeded) has been tentatively identified as a requirements.

7.2 Provision of individual bearer services

In the following table the provision of individual circuit mode alternate speech/64 kbit/s unrestricted 8 kHz structured bearer services is given. The definition of E (essential) and A (additional) can be found in Recommendation I.230.

a) overall provision: A (Note 1)

b) variations of secondary attributes

establishment of communication	symmetry	communication configuration	provision
I.231.4/1 demand)		pt-pt	E
I.231.4/2 reserved)		pt-pt	A
I.231.4/3 permanent)	bidirectional	pt-pt	E
I.231.4/4 demand)		multipt	A
I.231.4/5 reserved)		multipt	A
I.231.4/6 permanent)		multipt	A

c) access

signalling & OAM		user information		
(Note 2)				
channel & rate	protocols	channel & rate	protocols	provision
D(16)	I.451 (Note 3)	B(64)	G.711/user defined	E
D(64)	I.451 (Note 3)	B(64)	G.711/user defined	E

Note 1 - Some networks will offer the speech phase of these services in a manner identical to the 3.1 kHz audio service.

Note 2 - Definition of protocols for OAM is for further study.

Note 3 - Demand service only FS for reserved and permanent services. The protocols for initiating the changeover between speech and unrestricted digital information and synchronizing this changeover are for further study.

8. Dynamic description

The dynamic description for this service needs further study and is not yet available.

I.231.5 - Circuit-mode 2 x 64 kbit/s unrestricted 8 kHz structured bearer service category

1. Definition

This bearer service category provides the unrestricted transfer of two 64 kbit/s user information flows over two B channels at the user network interface.

2. Description

For further study.

3. 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 the service.

5. Interworking requirements

For further study.

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 2 x 64 kbit/s unrestricted 8 kHz structured bearer service category

Information transfer attributes

1) Information transfer mode : Circuit

2) Information transfer rate : 2 x 64 kbit/s

3) Information transfer capability : unrestricted (Note 1)
4) Structure : 8 kHz integrity with restricted differential time delay (RDTD)

5) Establishment of communication : demand/reserved/permanent

6) Symmetry : bidirectional symmetric/ bidirectional-asymmetric
unidirectional

7) Communication configuration : point-to-point/multipoint

Note 1 - Digit sequence integrity (DSI) is ensured for each elementary 64 kbit/s information.

Access attributes

8) Access channel : two B (64) for user information
9) Access protocol : I-Series for D channel

General attributes

10) Supplementary services provided ⫫

11) Quality of service ⫫

for further study

12) Interworking possibilities

13) Operation and commercial aspects

7.2 Provision for individual bearer services

In the following table the provision of individual circuit-mode 2 x 64 kbit/s unrestricted 8 kHz structured bearer services is given. The definition of E (essential) and A (additional) can be found in Recommendation I.230.

a) overall provision: A

b) variations of secondary attributes

establishment of communication	symmetry	communication configuration	provision
I.231.5/1 demand	bidirectional	pt-pt	E
I.231.5/2 reserved	bidirectional	pt-pt	A
I.231.5/3 permanent	bidirectional	pt-pt	E
other combinations			A

c) access

signalling & OAM (Note 2)		user information		
channel & rate	protocols	channel & rate	protocols	provision
D(16)	I.451 (Note 1)	2xB(64)	user-defined	E
D(64)	I.451 (Note 1)	2xB(64)	user-defined	E

Note 1 - Demand service only. FS for reserved permanent.

Note 2 - Definition of protocols for OAM is for further study.

8. Dynamic description

The dynamic description for this service needs further study and is not yet available.

I.231.6 - Circuit-mode 384 kbit/s unrestricted 8 kHz structured bearer service category

1. Definition

This bearer service provides the unrestricted transfer of 384 kbit/s user information over a Ho channel at the S/T reference point. The transfer of OAM information for reserved and permanent services may be provided over a D channel in the same or in another interfaces structure.

2. Description

For further study.

3. 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 the service.

5. Interworking requirements

For further study.

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 384 kbit/s unrestricted 8 kHz structured bearer service category

Attributes/values

Information transfer attributes

1) Information transfer mode : Circuit

2) Information transfer rate : 384 kbit/s

3) Information transfer capability : unrestricted

4) Structure : 8 kHz integrity

5) Establishment of communication : demand/reserved/permanent

6) Symmetry : bidirectional symmetric/ bidirectional-asymmetric/
unidirectional (Note)

7) Communication configuration : point-to-point/multipoint

Note 1 - Bidirectional-asymmetric services are for further study.

Access attributes

8) Access channel : Ho (384) for user information D (16) or D (64) for OAM information

9) Access protocol : I-Series for D channel

General attributes

10) Supplementary services provided

11) Quality of service

for further study

12) Interworking possibilities

13) Operation and commercial aspects

7.2 Provision for individual bearer services

In the following table the provision of individual circuit-mode 384 kbit/s unrestricted 8 kHz structured bearer services is given. The definition of E (essential) and A (additional) can be found in Recommendation I.230.

a) overall provision: A

b) variations of secondary attributes

	establishment of communication	symmetry	communication configuration	provision
I.231.6/1	demand	bidirectional	pt-pt	A
I.231.6/2	reserved	bidirectional	pt-pt	E
I.231.6/3	permanent	bidirectional	pt-pt	E
I.231.6/4	reserved	unidirectional	pt-pt	A
I.231.6/5	permanent	unidirectional	pt-pt	A
I.231.6/6	reserved	bidirectional	multipt	A
I.231.6/7	permanent	bidirectional	multipt	A
I.231.6/8	reserved	unidirectional	multipt	A
I.231.6/3	permanent	unidirectional	multipt	A

c) access

signalling & OAM		user information		
	channel & rate	protocols (Note 1)	channel & rate	protocols	provision
	D(64)	I.451 (Note 2)	Ho(384)	user-defined	E

(3293)

D(16) I.451 (Note 2) Ho(384) user-defined E

Note 1 - Definition of protocols for OAM is for further study.

Note 2 - Demand service only. FS for reserved and permanent services.

8. Dynamic description

The dynamic description for this service needs further study and is not yet available.

I.231.7 - Circuit-mode 1536 kbit/s unrestricted 8 kHz structured bearer service category

1. Definition

This bearer service category provides the unrestricted transfer of 1536 kbit/s user information over a H11 channel at the S/T reference point. Transfer of OAM information for reserved and permanent services may be provided via a D channel in another interface structure.

2. Description

For further study.

3. 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 the service.

5. Interworking requirements

For further study.

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 1536 kbit/s unrestricted 8 kHz structured bearer service category

Attributes/values

Information transfer attributes

1) Information transfer mode : Circuit

2) Information transfer rate : 1536 kbit/s

3) Information transfer capability : unrestricted

4) Structure : 8 kHz integrity

5) Establishment of communication : demand/reserved/permanent

6) Symmetry : bidirectional symmetric/ bidirectional-asymmetric/
unidirectional (Note)

7) Communication configuration : point-to-point/multipoint

Note 1 - Bidirectional-asymmetric services are for further study.

Access attributes

8) Access channel : H11 (1536) for user information D (16) or D (64) for OAM signalling

9) Access protocol : I-Series for D channel

General attributes

10) Supplementary services provided

11) Quality of service

for further study

12) Interworking possibilities

13) Operation and commercial aspects

7.2 Provision for individual bearer services

In the following table the provision of individual circuit-mode 1536 Kbit/s unrestricted 8 kHz structured bearer services is given. The definition of E (essential) and A (additional) can be found in Recommendation I.230.

a) overall provision: A

b) variations of secondary attributes

	establishment of communication	symmetry	communication configuration	provision
I.231.7/1	demand	bidirectional	pt-pt	A
I.231.7/2	reserved	bidirectional	pt-pt	E
I.231.7/3	permanent	bidirectional	pt-pt	E

I.231.7/4 reserved	unidirectional	pt-pt	A
I.231.7/5 permanent	unidirectional	pt-pt	A
I.231.7/6 reserved	bidirectional	multipt	A
I.231.7/7 permanent	bidirectional	multipt	A
I.231.7/8 reserved	unidirectional	multipt	A
I.231.7/9 permanent	unidirectional	multipt	A

c) access

signalling & OAM		user information		
(Note 1)				
channel & rate	protocols	channel & rate	protocols	provision
D(16)	I.451 (Note 3) (Note 2)	H11(1536)	user-defined	E
D(64)	I.451 (Note 3) (Note 2)	H11(1536)	user-defined	E

Note 1 - Definition of protocols for OAM is for further study.

Note 2 - Located on another interface.

Note 3 - Demand service only. FS for reserved and permanent services.

8. Dynamic description

The dynamic description for this service needs further study and is not yet available.

I.231.8 - Circuit-mode 1920 kbit/s unrestricted 8 kHz structured bearer service category

1. Definition

This bearer service category provides the unrestricted transfer of 1920 kbit/s user information over a H12 channel at the S/T reference point. The transfer of OAM information for reserved and permanent services may be provided over a D channel.

2. Description

For further study.

3. Procedures

For further study.

4. Network aspects for charging

This Recommendation does not cover charging principles. Future Recommendations in the D-Series are

expected to contain that informaion.

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

5. Interworking requirements

For further study.

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 1920 kbit/s unrestricted 8 kHz structured bearer service category

Information transfer attributes

1) Information transfer mode : Circuit

2) Information transfer rate : 1920 kbit/s

3) Information transfer capability : unrestricted

4) Structure : 8 kHz integrity

5) Establishment of communication : demand/reserved/permanent

6) Symmetry : bidirectional symmetric/ bidirectional-asymmetric/
unidirectional (Note 1)

7) Communication configuration : point-to-point/multipoint

Note 1 - Bidirectional-asymmetric services are for further study.

Access attributes

8) Access channel : H12 (1920) for user information D (64) for OAM information

9) Access protocol : I-Series for D channel

General attributes

10) Supplementary services provided refer to I.250

11) Quality of service ⫫

⫫

12) Interworking possibilities ⫫ for further study

13) Operation and commercial aspects

7.2 Provision for individual bearer services

In the following table the provision of individual circuit-mode 1920 Kbit/s unrestricted 8 kHz structured bearer services is given. The definition of E (essential) and A (additional) can be found in Recommendation I.230.

a) overall provision: A

b) variations of secondary attributes

	establishment of communication	symmetry	communication configuration	provision
I.231.8/1	demand	bidirectional	pt-pt	A
I.231.8/2	reserved	bidirectional	pt-pt	E
I.231.8/3	permanent	bidirectional	pt-pt	E
I.231.8/4	reserved	unidirectional	pt-pt	A
I.231.8/5	permanent	unidirectional	pt-pt	A
I.231.8/6	reserved	bidirectional	multipt	A
I.231.8/7	permanent	bidirectional	multipt	A
I.231.8/8	reserved	unidirectional	multipt	A
I.231.8/9	permanent	unidirectional	multipt	A

c) access

signalling & OAM (Note 1)		user information		
	channel & rate	protocols	channel & rate	protocols	provision
D(64)	I.451 (Note 2)	H12(1920)	user-defined	E

Note 1 - Definition of protocols for OAM is for further study.

Note 2 - Demand service only. FS for reserved and permanent services.

8. Dynamic description

The dynamic description for this service needs further study and is not yet available.