Recommendation I.232 - Packet mode bearer services categories

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.

The purpose of this Recommendation is to define a recommended set of packet mode bearer services categories, to describe individual packet 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:

- virtual call and permanent virtual circuit bearer service category;
- connectionless bearer service category;
- user signalling bearer service category.

I.232.1 - Virtual call and permanent virtual circuit bearer service category

1. Definition

This bearer service category provides the unrestricted transfer (without alteration) of user information in a packetized manner over a virtual circuit within a B or D channel at the S/T reference point. Signalling information for virtual call and/or possibly OAM information for permanent virtual circuit services are transferred via B or D channel as described in Recommendation I.462 (X.31).

2. Description

2.1 General description

This packet mode bearer service category allows users (e.g., terminals) in a point-to-point communication configuration to communicate via the ISDN using X.25 encoding, by means of Recommendation I.462 (X.31) procedures over either B or D channels, in both directions continuously and simultaneously for the duration of a call.

2.2 Specific terminology

Not applicable.

2.3 Qualifications

Not applicable.

3. Procedures

Detailed procedures for virtual calls appear in Recommendation I.462 (X.31) case B. This description is a synopsis of those procedures. For actual, complete procedures, refer to Recommendation I.462.

3.1 Provision/withdrawal

For further study.

3.2 Normal procedures

3.2.1 Activation/Deactivation/Registration

Not applicable.

3.2.2 Invocation and operation

3.2.2.1 Virtual call procedures

a) Call establishment

For virtual calls, X.25 will be used on an active channel (B or D) to the packet handler. In order to establish that channel and/or to negotiate the type of channel to be used, out- of-band signalling procedures may be used. Once connected to the packet handler, remaining call information, including called user address, are signalled in the X.25 call request.

b) Data transfer phase

Once established, the virtual circuit is then available for unrestricted X.25 data transfer in both directions continuously and simultaneously. During the data transfer phase, information exchange occurs with the following characteristics, among others:

- packetized;
- flow control;
- delivery confirmation (optional);
- reset/interrupt.

c) Terminating the call

The call may be terminated by either of both of the users by indicating this to the network. In either case, an appropriate indication is sent to the other user. The active channel may be released after the termination of the last virtual call on that channel.

3.2.2.2 Permanent virtual circuit procedures

For permanent virtual circuits on B or D channels there is no call set up or clearing. For permanent virtual circuits using B channel access, a semi- permanent connection of the channel to the packet handler must be in place. The procedures for the control of packets between user terminal equipment and network are covered by X.25 data

transfer phase.

3.2.3 Interrogation/Editing

Not applicable.

3.3 Exceptional procedures

3.3.1 Activation/Deactivation/Registration

Not applicable.

3.3.2 Invocation and operation

3.3.2.1 Virtual call

In case of failure situations due to calling/called user error, user state, or network conditions, appropriate failure indications will be signalled from the network and the call set-up or established call may be terminated. For detailed procedures, see Recommendation I.462.

3.3.2.2 Permanent virtual circuit

In case of failure situations due to user error, user state, or network conditions, appropriate failure indications will be signalled from the network. For detailed procedures, see Recommendation I.462.

3.3.3 Interrogation/Editing

Not applicable.

3.4 Alternative procedures

Not applicable.

3.5 Verification

Not applicable.

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 Virtual call charging

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

4.2 Permanent virtual circuit charging

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

5. Interworking

General interworking arrangements for this bearer service category are defined in Recommendation X.300. Specific interworking procedures are in Recommendation I.462.

6. Interaction with supplementary services

(Not applicable.)

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

7.1 Attributes/values

Information transfer attributes

1)	Information transfer mode	packet
2)	Information transfer rate	maximum throughput of a given virtual circuit is less than or equal to the maximum bit rate of the user information access channel and the throughput class of the virtual circuit
3)	Information transfer capability	unrestricted
4)	Structure	service data unit integrity
5)	Establishment of communication	demand (virtual call)/ permanent (permanent virtual circuit)
6)	Symmetry	bidirectional symmetric
7)	Communication configuration	point-to-point

Access attributes

8)	Access channel	user information over virtual circuit within B or D channel. When D channelis used, maximum packet size and quality of service may be restricted. Signalling may be provided via D-channel and/or virtual circuit within B-channel
9)	Access protocol	as specified in Recommendations I.440, I.450, I.451, I.462 and X.25 (layers 2 and 3)

General attributes

10)	Supplementary services provided	as listed in Recommendation X.2. Others are for further study
11-13)		for further study

7.2 Provision of individual bearer services

a) overall provision: E

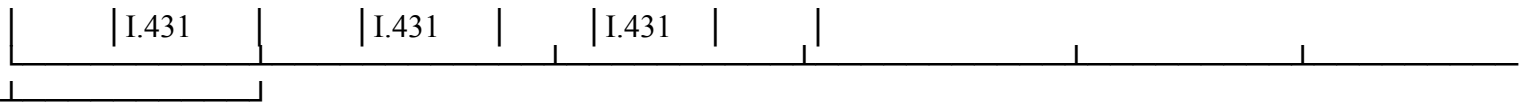
b) variations of secondary attributes:

Information transfer rate	Establishment of communication	Symmetry	Communication configuration	Provision
Note 1	demand	Bidirectional Symmetric	pt-pt	E
Note 1	permanent	Bidirectional Symmetric	pt-pt	E

Note 1 - The exact values of information transfer rates for the virtual call and permanent virtual circuit are for further study.

c) Access

Access Channel Control		Virtual Call Control		Provision
Signalling and OAM (Notes 1 and 2)		Signalling and OAM (Notes 1 and 3)		User information
Channel and rate	Protocols	Channel and rate	Protocols	Channel and rate	Protocols	
D(16)	I.451, I.441, I.430	B(64)	X.25 L3, X.25 L2, I.430	B(64)	X.25 L3, X.25 L2, I.430	A
D(64)	I.451, I.441, I.431	B(64)	X.25 L3, X.25 L2, I.431	B(64)	X.25 L3, X.25 L2, I.431	A
D(16)	I.451, I.441, I.430	D(16)	X.25 L3, I.441, I.430	D(16)	X.25 L3, I.441, I.430	A
D(64)	I.451, I.441,	D(64)	X.25 L3, I.441,	D(64)	X.25 L3, I.441,	A



Note 1 - The definition of other protocols for OAM is for further study.

Note 2 - The protocols listed in this column are for establishing communications with the packet handling function using out-of-band call control signals. This procedure does not apply in certain cases (for example, semi-permanent D channel connection).

Note 3 - The protocols listed in this column are for the establishment of a virtual circuit using X.25 procedures. These procedures do not apply to permanent virtual circuits.

8. Dynamic description

Dynamic descriptions for the Recommendation I.462 procedures in the virtual call and permanent virtual circuit bearer service category are for future study. State transition diagrams for layer 3 of Recommendation X.25 (Annex B) apply for virtual call and permanent virtual circuit.

I.232.2 - Connectionless bearer service category

Note - This connectionless bearer service category is a different concept from, and should not be confused with, the OSI Connectionless Mode Network Service. Thus, the name of this service may change as the service is better defined.

Further aspects of this bearer service category are for further study.

I.232.3 - User signalling bearer service category

Note - This service is different from, and should not be confused with, the user-to-user signalling supplementary service (see I.257). The user-to-user signalling supplementary service is used in conjuction with either a bearer service or a teleservice. The user signalling bearer service stands on its own and is not used in conjunction with a bearer service or a teleservice.

Further aspects of this bearer service category are for further study.