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STANDARDIZATION SECTOR
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I.232.1

**INTEGRATED SERVICES DIGITAL NETWORK (ISDN)
SERVICE CAPABILITIES – BEARER SERVICES
SUPPORTED BY AN ISDN**

**PACKET-MODE BEARER SERVICE
CATEGORIES – VIRTUAL CALL AND
PERMANENT VIRTUAL CIRCUIT BEARER
SERVICE CATEGORY**

ITU-T Recommendation I.232.1

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation I.232.1 was published in Fascicle III.7 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

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.232.1

PACKET MODE BEARER SERVICE CATEGORIES – VIRTUAL CALL AND PERMANENT VIRTUAL CIRCUIT BEARER SERVICE CATEGORY

(Melbourne, 1988)

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

1.1 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-channels as described in Recommendation I.462 (X.31).

1.2 Description

1.2.1 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.

1.2.2 Specific terminology

Not applicable.

1.2.3 Qualifications

Not applicable.

1.3 Procedures

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

1.3.1 Provision/withdrawal

For further study.

1.3.2 Normal procedures

1.3.2.1 Activation/deactivation/registration

Not applicable.

1.3.2.2 *Invocation and operation*

1.3.2.2.1 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 or 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.

1.3.2.2.2 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.

1.3.2.3 Interrogation/editing

Not applicable.

1.3.3 Exceptional procedures

1.3.3.1 Activation/deactivation/registration

Not applicable.

1.3.3.2 Invocation and operation

1.3.3.2.1 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.

1.3.3.2.2 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.

1.3.3.3 Interrogation/editing

Not applicable.

1.3.4 Alternative procedures

Not applicable.

1.3.5 Verification

Not applicable.

1.4 Network capabilities for charging

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

1.4.1 Virtual call charging

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

1.4.2 Permanent virtual circuit charging

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

1.5 Interworking requirements

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

1.6 Interaction with supplementary services

Not applicable.

1.7 Attributes and values of attributes of the virtual call and permanent virtual circuit bearer service category

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 (Note)
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-channel is 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. Quality of Service | } Error! Reference source not found. |
| 12. Interworking possibilities | } Error! Reference source not found. for further study |
| 13. Operational and commercial aspects | } |

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

1.8 Provision of virtual call and permanent virtual circuit bearer service

- a) Overall provision: E
- b) Variations of secondary attributes:

<i>Establishment de of communication</i>	<i>Symmetry</i>	<i>Communication of configuration</i>	<i>Provision</i>
demand } permanent }	bidirectional symmetric	pt-pt pt-pt	E E

- c) *Access*

Access channel control Signalling and OAM (Notes 1 and 2)		Virtual call control Signalling and OAM (Notes 1 and 3)		User information		Provision
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 I.431	D(64)	X.25, L3 I.441 I.431	D(64)	X.25, L3 I.441 I.431	A

L1, L2 and L3 Layer 1, layer 2 and layer 3

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.

1.9 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.