Recommendation X.325[1)]

GENERAL ARRANGEMENTS FOR INTERWORKING BETWEEN

PACKET SWITCHED PUBLIC DATA NETWORKS (PSPDNs)

AND INTEGRATED SERVICES DIGITAL NETWORKS (ISDNs)

FOR THE PROVISION OF DATA TRANSMISSION SERVICES

(Melbourne, 1988)

The CCITT,

considering

(a) that Recommendation X.300 defines the general principles for interworking between public networks, and between public networks and other networks for the provision of data transmission services;

(b) that Recommendation X.301 defines the general arrangements for call control within a subnetwork and between subnetworks for the provision of data transmission services;

(c) that Recommendation X.302 defines the general arrangements for internal network utilities within a subnetwork and between subnetworks for the provision of data transmission services;

(d) that Recommendation X.75 already specifies detailed procedures applicable to call control between public networks providing data transmission services;

(e) that Recommendation X.10 describes categories of access to PSPDNs and ISDNs for the provision of data transmission services;

(f) that Recommendation X.213 describes the network service definition for open systems interconnection for CCITT applications;

(g) that Recommendation X.305 describes functionalities of subnetworks relating to the support of the OSI network service;

(h) the need for arrangements when interworking between ISDNs and PSPDNs for the provision of data transmission services,

unanimously recommends

that arrangements for the interworking between PSPDNs and ISDNs for the provision of data transmission services be in accordance with the principles and arrangements specified in this Recommendation.

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0 Introduction

This Recommendation is one of a set of Recommendations produced to facilitate considerations of interworking between networks. It is based on Recommendation X.300, which defines the general principles for interworking between public networks, and between public networks and other networks for the provision of data transmission services. Recommendation X.300 indicates in particular how collections of physical equipment can be represented as ÒsubnetworksÓ for consideration in interworking situations.

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1) This Recommendation can also be found in the I-series, under the number I.540.

This Recommendation describes the interworking arrangements between ISDNs and PSPDNs for the provision of data transmission services.

1 Scope and field of application

The purpose of this Recommendation is to describe the general arrangements for the interworking between PSPDNs and ISDNs for the provision of data transmission services. These arrangements are applicable only to the interworking involving transmission capabilities, and not to interworking involving communication capabilities as described in Recommendation X.300.

Note - The typing of subnetworks in this Recommendation is based on the support for the OSI connection-mode network service and is therefore only valid in this context.

2 References

[1] Recommendation X.300

[2] Recommendation X.301

[3] Recommendation X.302

[4] Recommendation X.305

[5] Recommendation X.31

[6] Recommendation X.75

[7] Recommendation X.1

[8] Recommendation X.2

[9] Recommendation X.10

[10] I.230 series Recommendations

I.250 series Recommendations

[11] Recommendation I.500

[12] Recommendation X.121

[13] Recommendation X.122

[14] Recommendation E.164

[15] Recommendation E.166

3 Definitions

This Recommendation makes use of the following terms defined in Recommendation X.300:

a) transmission capability,

b) communication capability,

c) subnetwork functionality,

d) data transmission service,

e) interworking by call-control mapping,

f) interworking by port access.

This Recommendation makes use of the following terms defined in the I.230 series Recommendations:

a) circuit switched bearer service,

b) packet switched virtual circuit bearer service.

4 Abbreviations

CNIC Clearing Network Identification Code

CUG Closed User Group

CUG/OA Closed User Group with Outgoing Access

DTE Data Terminal Equipment

ISDN Integrated Services Digital Network

IWF Interworking Function

MSS Mobile Satellite System

PSPDN Packet Switched Public Data Network

SS No. 7 Signalling System No. 7

TA Terminal Adaptor

TE Terminal Equipment

TNIC Transit Network Identification Code

5 General aspects

This Recommendation, in describing interworking arrangements between two subnetworks for the provision of data transmission services, adheres to the general principles of Recommendation X.300. The environments of these two subnetworks are described in the following sections. See also Table 1/X.325.

5.1 *PSPDN*

The PSPDN provides packet switched data transmission services services as defined in Recommendations X.1 and X.2 for the provision of data transmission services, the PSPDN may be accessed by DTEs by the categories of access C and D as defined in Recommendation X.10. In addition, the PSPDN may also be accessed via other networks, i.e., PSTN (X.10 categories L, P), CSPDN (X.10, categories K, O), PSPDN (Recommendation X.75), MSS (Recommendation X.75), or ISDN (this Recommendation and X.10, category Q). Private networks access the PSPDN via X.10, category of access D.

5.2 *ISDN*

The ISDN may provide packet switched and/or circuit switched data transmission services/bearer services as defined in Recommendations X.1, the I.230 series, and X.2.

Note - Supplementary services/optional user facilities for the circuit-mode operation on ISDN are in the I.250 series. Recommendation X.2 applies to ISDN packet switched data transmission services/bearer services.

For the provision of data transmission services, the ISDN may be accessed by DTEs/TEs by the categories of access S, T, U as defined in Recommendation X.10 and/or the access methods defined in the I.230 series Recommendations. In addition, the ISDN may also be accessed via other networks, i.e., PSTN (Recommendation I.530), CSPDN (Recommendation X.10, category B and Recommendation X.321), PSPDN (this Recommendation), MSS (Recommendation X.324), or ISDN (SS No. 7, Recommendations X.75 and X.10, category Y).

Note - In the context of this Recommendation, and for the purpose of provision of data transmission services only, the following categories of bearer services defined in the I.230 series Recommendations are considered. (Others are for further study.):

a) circuit-mode 64 kbit/s unrestricted, 8 kHz structured;

b) circuit-mode 64 kbit/s, 8 kHz structured, usable for speech information transfer;

c) circuit-mode 64 kbit/s, 8 kHz structured, usable for 3.1 kHz audio information transfer;

d) virtual call and permanent virtual circuit.

5.3 *Call control between the PSPDN and ISDN*

The general arrangements for call control between the PSPDN and ISDN are as defined in Recommendation X.301. Network utilities used between the PSPDN and ISDN are as defined in Recommendation X.302 (not visible for users). Supplementary services/optional user facilities for the circuit-mode operation on ISDN are in the I.250 series Recommendations.

5.4 *Functionalities of the PSPDN and ISDN*

The functionalities of different types of subnetworks are described in Recommendation X.305. In the case where the ISDN is used to provide a packet switched data transmission service/bearer service, the functionality of the PSPDN and ISDNs differ. Therefore, in order to enable interworking, procedures must be operated over the circuit

switched bearer on the PSPDN to achieve functional compatibility. In the case where the ISDN is used to provide a packet switched data transmission service/bearer service, the PSPDN and ISDN are functionally compatible.

6 **Specific** interworking arrangements

As described in Recommendation X.300, the following interworking cases should be distinguished:

a) interworking between PSPDN and ISDN where a packet switched bearer is used;

b) interworking between PSPDN and ISDN where a circuit switched bearer is used:

1) interworking by call-control mapping;

2) interworking by port access.

TABLE 1/X.325

Comparison of general characteristics of PSPDN and ISDN

General characteristics	PSPDN	ISDN
Data transmission service/ Bearer service	X.1, X.2	X.1, I.230 Series
Optional user facilities/ Supplementary services	X.2	Circuit-Mode I.250 Series Packet-Mode X.301
Categories of access	X.10 categories C, D	X.10 categories S, T, U See also ¤ 5.2 of this Recommendation
Access via other networks		
STN	X.10 categories L, P	I.530
SPDN	X.10 categories K, O	Recommendations X.321, X.10 category B
SPDN	X.75	This Recommendation, X.10 categories C, D
SS	X.75	X.324
SDN	This Recommendation	SS No. 7, X.75 X.10 category Y

6.1 *Interworking between PSPDN and ISDN where a packet switched bearer is requested*

The detailed procedures for interworking by call-control mapping are defined in Recommendation X.75 (see Figure 1/X.325). In particular, the following applies:

Figure 1/X.325 - T0700511-88

6.1.1 *Transfer of addressing information*

ISDNs and PSPDNs typically utilize different numbering plans (i.e., E.164 and X.121 respectively). The considerations on the transfer of addressing informations of the two different types as described in Recommendation X.301 apply. Further specifics on interworking between the two numbering plans concerned, are detailed in Recommendations E.166 and X.122.

6.1.2 *Arrangements for facilities related to the QOS of the call*

These arrangements are as described in Recommendation X.301. However, for the throughput facility, different classes are supported in the ISDN and PSPDN (i.e., the class of 64 kbit/s). Whenever a request is made for a throughput class higher than 48 kbit/s from the ISDN, the request should be negotiated down to a lower class supported on the PSPDN.

6.1.3 *Arrangements for facilities related to charging conditions applying to the call*

These arrangements are as described in Recommendation X.301.

6.1.4 *Arrangements for facilities relating to specific routing conditions applying to the call*

These arrangements are as described in Recommendation X.301.

6.1.5 *Arrangements for facilities related to protection mechanisms requested by the user of a call*

These arrangements are as described in Recommendation X.301. In particular, for the CUG and CUG/OA facilities the interlock code mechanism described in Recommendation X.180 shall be applied.

6.1.6 *Arrangements for facilities to convey user data in addition to the normal data flow in the data transfer phase*

These arrangements are as described in Recommendation X.301.

6.1.7 *Arrangements for other facilities*

These arrangements are as described in Recommendation X.301.

6.1.8 *Arrangements for internal network utilities (not visible for users)*

These arrangements are as described in Recommendation X.302. In particular, the mechanisms for network identification are applied as follows:

- the PSPDN is identified by the DNIC/DCC method;
- the ISDN is identified by the Recommendation X.302 method.

These network identifications are then further applied in the TNIC and CNIC utilities of Recommendation X.75.

6.2 Interworking between a PSPDN and ISDN where a circuit switched *bearer is requested*

6.2.1 *Interworking by call-control mapping*

Figure 2/X.325 - T0700532-88

This case of interworking by call-control mapping is not covered in Recommendation X.31. In order to enable interworking, procedures must be operated over the ISDN circuit switched bearer to achieve functional compatibility. However, these procedures are for further study. In general, the following applies:

- Call-control arrangements in the ISDN (i.e., I.420 or the functionally identical SS No. 7 protocol or a functionally identical internal network protocol) should be mapped in the IWF to the call-control arrangements in the PSPDN (i.e., X.75, or a functionally identical internal network protocol). This mapping is for further study.

- Data transfer arrangements in the PSPDN (i.e., X.75, or a functionally identical internal network protocol) should be mapped in the IWF to the procedures operated over the circuit switched bearer between IWF and TE/DTE. This mapping is for further study.

6.2.2 *Interworking by port access*

In order to enable interworking, procedures must be operated over the ISDN circuit switched bearer to achieve functional compatibility. These procedures follow Recommendation X.25 (see Recommendation X.31 and X.10 access category Y). Aspects of X.32 apply as noted in X.31.

In general, the following applies:

- X.75, or a functionally identical internal network protocol is operated between the PSPDN and the IWF.

- I.420, or ISDN-UP, or a functionally identical internal network protocol is operated between the ISDN and the IWF, and used to control the circuit switched bearer.

- X.25 is operated between the IWF and the DTE/TE over the ISDN circuit switched bearer.

ÒDialling outÓ considerations:

A circuit switched bearer will be set up through the ISDN upon receipt of a X.75 call request packet, i.e.:

- The Q.931 called party number (and subaddress, if provided) are derived from the X.75 call request packet.

- The Q.931 bearer capability is coded as circuit mode.

- After establishment of the circuit switched bearer, a link connection will be established and the X.75 call request packet will be mapped by the IWF to an X.25 incoming call packet.

- Further procedures are as detailed in Recommendation X.31.

ÒDialling inÓ considerations:

A circuit switched bearer will be set up through the ISDN, i.e.:

- The Q.931 called party number is the address of the IWF (port address).

- The Q.931 bearer capability is coded as circuit mode.

- After establishment of the circuit switched bearer, a link connection will be established.

- An X.25 call request packet will be mapped by the IWF to an X.75 call request packet.

- Further procedures are as detailed in Recommendation X.31.

Figure 3/X.325 - T0700541-88