Recommendation X.320

GENERAL ARRANGEMENTS FOR INTERWORKING BETWEEN

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 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) that Recommendation I.520 describes requirements for ISDN-ISDN interworking for both non-data and data transmission services;

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

unanimously declares

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

CONTENTS

0 *Introduction*

1 *Scope and field of application*

2 *References*

3 *Definitions*

4 *Abbreviations*

5 *General aspects*

6 *Specific interworking arrangements*

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.

This Recommendation describes the interworking arrangements between ISDNs and ISDNs 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 ISDNs 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,

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.320.

5.1 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 (Recommendations X.325 and X.10, categories C, D), MSS (Recommendation X.324), or ISDN (SS No. 7, Recommendation X.75, Recommendation X.10, category Y and this Recommendation).

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.

5.2 Call control between the ISDN and ISDN

The general arrangements for call control between ISDNs 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.

5.3 Functionalities of the ISDN

The functionalities of different types of subnetworks are described in Recommendation X.305. In the case where one ISDN is used to provide a circuit switched data transmission service/bearer service and another ISDN is used to provide a packet switched data transmission service/bearer service, the functionality of the two ISDNs differs. Therefore, in order to enable interworking, procedures must be operated over the circuit switched bearer to achieve functional compatibility. In the case where both ISDNs are used to provide a packet switched data transmission service/bearer service or both ISDNs are used to provide a circuit switched data transmission service/bearer service, the ISDNs are functionally compatible.

TABLE 1/X.320

General characteristics of ISDN

General characteristics	ISDN
Data transmission service/Bearer service	X.1, I.230 Series
Optional user facilities/Supplementary services	Circuit-Mode I.250 Series, Packet-Mode X.301
Categories of access	X.10 categories S, T, U See also ¤ 5.1 of this Recommendation
Access via other networks	
PSTN	I.530
CSPDN	Recommendations X.321, X.10 category B
PSPDN	Recommendations X.325, X.10 categories C, D
MSS	X.324
ISDN	SS No. 7, X.75, X.10 category Y, this Recommendation

6 Specific interworking arrangements

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

a) interworking between ISDNs, each using a packet switched bearer;

b) interworking between ISDNs, each using a circuit switched bearer;

c) interworking between ISDNs, where a packet switched bearer is used on one ISDN, and a circuit switched bearer is used on the other:

1) interworking by call-control mapping;

2) interworking by port access.

6.1 Interworking between ISDNs, where a packet switched bearer *is requested on each*

The detailed procedures for interworking by call-control mapping are defined in Recommendation X.75 (see Figure 1/X.320). The use of other Recommendations is for further study. In particular, the following applies:

Figure 1/X.320 - T0706320-88

6.1.1 *Transfer of addressing information*

ISDN typically utilize the E.164 numbering plan. The considerations on the transfer of E.164 addressing information in X.75 are given in Recommendation X.301.

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

These arrangements are as described in Recommendation X.301.

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

These arrangements are as described in Recommendation X.301.

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6.1.4 *Arrangements for facilities related to specific routing conditions requested by the user of 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 ISDN is identified by the Recommendation X.302 method.

This network identification is then further applied in the TNIC and CNIC utilities of Recommendation X.75.

6.2 Interworking between ISDNs where a circuit switched bearer *is requested on each*

The detailed procedures for interworking are defined in Signalling System No. 7, ISDN-user part (see Figure 2/X.320). In particular, the following applies:

Figure 2/X.320 - T0706330-88

6.2.1 *Transfer of addressing information*

ISDNs typically utilize the E.164 numbering plan. The considerations on the transfer of addressing information are given in Recommendation X.301.

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

These arrangements are as described in Recommendation X.301.

6.2.3 *Arrangements for facilities related to changing conditions applying to the call*

These arrangements are as described in Recommendation X.301.

6.2.4 *Arrangements for facilities related to specific routing conditions requested by the user of the call*

These arrangements are as described in Recommendation X.301.

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

These arrangements are as described in Recommendation X.301.

6.2.6 *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.

6.2.7 *Arrangements for other facilities*

These arrangements are as described in Recommendation X.301.

6.2.8 *Arrangements for internal network utilities*

These arrangements are as described in Recommendation X.302.

6.3 Interworking between ISDNs where a packet switched bearer *is used on one, and a circuit switched bearer is used on the other*

6.3.1 *Interworking by call-control mapping*

Figure 3/X.320 - T0706340-88

In order to enable interworking, procedures must be operated over the ISDN circuit switched bearer to achieve functional capability. However, these procedures are for further study. In general, the following applies:

- Call-control arrangements in the circuit-switched case of ISDN (i.e. I.420 or the functionality 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 packet switched case of ISDN (i.e., X.75 or a functionally identical internal network protocol). This mapping is for further study.

- Data transfer arrangements in the packet switched case of ISDN (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.

6.3.2 Interworking by port access

Figure 4/X.320 - T0706350-88

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 Recommendations 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 packet switched case of ISDN and IWF.

- I.420, or ISDN-UP, or a functionally identical internal network protocol is operated between the circuit switched case of 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.