Recommendation X.322

GENERAL ARRANGEMENTS FOR INTERWORKING BETWEEN **PACKET SWITCHED PUBLIC DATA NETWORKS (PSPDNs) AND CIRCUIT SWITCHED PUBLIC DATA NETWORKS (CSPDNs) 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 defines procedures for PSPDN/PSPDN interworking and that Recommendations X.61 and X.71 define procedures for CSPDN/CSPDN interworking;

(e) that Recommendation X.10 describes categories of access to PDNs 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 desirability to maintain compatibility in the procedures used at layers 1, 2 and 3 on CSPDN, for current and future telematic terminals, and also for terminals in non-telematic applications;

(i) that Recommendation X.223 defines the use of X.25 to provide the OSI connection-mode network service;

(j) that Recommendation T.70 defines the network-independent basic transport service for the telematic services;

(k) that Recommendation X.32 defines the interface between DTE and DCE for terminals operating in the packet-mode and accessing a PSPDN through a PSTN or an ISDN or a CSPDN;

(l) that Recommendation X.82 defines detailed arrangements for interworking between CSPDNs and PSPDNs based on Recommendation T.70;

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

unanimously recommends

that arrangements for the interworking between PSPDNs and CSPDNs 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.

This Recommendation describes the interworking arrangements between CSPDNs 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 CSPDNs for the provision of data transmission services (Note 1). 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 1 - These arrangements could also be used for the support of telematic services.

Note 2 - 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 that context.

Other types of subnetworks supporting other services and applications are for further study.

2 References

X.300 General principles for interworking between public networks, and between public networks and other networks for the provision of data transmission services

X.301 Description of the general arrangements for call control within a subnetwork and between subnetworks for the provision of data transmission services

X.302 Description of the general arrangements for internal network utilities within a subnetwork and intermediate utilities between subnetworks for the provision of data transmission services

X.305 Functionalities of subnetworks relating to the support of the OSI connection-mode network service

X.1 International user classes of service in public data networks and integrated services digital networks (ISDNs)

X.2 International data transmission services and optional user facilities in public data networks and ISDNs

X.10 Categories of access for data terminal equipment (DTE) to public data transmission services

X.71 Decentralized terminal and transit control signalling system on international circuits between synchronous data networks

X.75 Packet switched signalling system between public networks providing data transmission services

X.82 Detailed arrangements for interworking between CSPDNs and PSPDNs based on Recommendation T.70

X.121 International numbering plan for public data networks

X.223 Use of X.25 to provide the OSI connection-mode network service for CCITT applications

T.70 Network independent basic transport service for telematic services

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) network*,

f) interworking by call control mapping,

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g) interworking by port access.

4 Abbreviations

CSPDN Circuit switched public data network

DTE Data terminal equipment

ISDN Integrated services digital network

IWF Interworking function

LAN Local area network

MSS Maritime satellite service

PBX Private branch exchange

PSPDN Packet switched public data network

PSTN Public switched telephone network

QOS Quality of service

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.

5.1 *PSPDN*

The PSPDN provides packet switched data transmission services described 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 category L, P), CSPDN (X.10 category K, O and this Recommendation), PSPDN (Recommendation X.75), MSS (Recommendation X.75), or ISDN (Recommendation X.325). Private networks access the PSPDN via X.10 category of access D.

5.2 *CSPDN*

The CSPDN provides circuit switched data transmission services described in Recommendations X.1 and X.2. For the provision of data transmission services, the CSPDN may be accessed by DTEs by the categories of access B as defined in Recommendation X.10. In addition, the CSPDN may also be accessed via other networks, i.e., PSPDN (this Recommendation), CSPDN (Recommendation X.71), or ISDN (Recommendation X.321). Access of private networks and mobile systems to the CSPDN is for further study (see Recommendation X.300).

5.3 *Call control between the PSPDN and CSPDN*

The general arrangements for call control between the PSPDN and CSPDN are as defined in Recommendation X.301. Network utilities used between the PSPDN and CSPDN are as defined in Recommendation X.302 (not visible for users).

5.4 *Functionalities of the PSPDN and CSPDN*

The functionalities of different types of subnetworks are described in Recommendation X.300. The functionalities of the PSPDN and CSPDN differ. Therefore, in order to enable interworking, procedures must be operated over the CSPDN to achieve functional compatibility.

Two different sets of procedures are considered for this purpose:

a) T.70 based procedures for the support of telematic procedures (see ¤ 6.1);

b) X.25 based procedures (see Recommendation X.32); (see ¤ 6.2).

However, the T.70 based procedures do not provide full functional compatibility; some protocol elements from the PSPDNs cannot be mapped by the IWF (see Recommendation X.82).

TABLE 1/X.322

Comparison of general characteristics of PSPDN and CSPDN

General characteristics	PSPDN	CSPDN
Data transmission service/ Bearer service	X.1, X.2	X.1, X.2
Optional user facilities/ Supplementary services	X.2	X.2
Categories of access	X.10 categories C, D	X.10 category B
Access via other networks		
PSTN	X.10 categories L, P	-
CSPDN	This Recommendation	X.71
PSPDN	X.323	This Recommendation
MSS	X.324	-
ISDN	X.325	X.321
Private networks	X.327	Further study

5.5 *Routing*

5.5.1 *Routing considerations related to the use of T.70*

a) When crossover from packet switched to circuit switched PDNs is needed, this changeover should occur as late as possible:

Figure 1/X.322 - T0701290-88

i.e., going from A to D, crossover at (3) is preferred.

b) The T.70 (¤ 3.3.3) based solution should not be used for cases where the CSPDN acts as transit network in cases where the preservation of functional compatibility is necessary to the highest possible extent.

c) It is for further study whether beyond an X.21 subscriber interface, typically private networks may need to be expected other than PBX type (circuit switched) of networks (e.g., not LANs). This assumption is particularly relevant for the treatment of QOS parameters in the IWF.

5.5.2 *IWF selection*

When the crossover from PSPDN to CSPDN is needed, the appropriate IWF must be selected, i.e., X.25 based IWF, or the T.70 based IWF. (In case the IWFs are physically colocated, still the proper procedures must be selected.) The appropriate selection can be made on the basis of the called DTE address.

6 Specific interworking arrangements

6.1 *Interworking by call control mapping*

The interworking arrangement is illustrated in Figure 2/X.322.

Figure 2/X.322 - T0706750-88

In this interworking arrangement:

a) the international arrangement between both subnetworks (i.e., in the figures between the interworking functions and the PSPDN) is based on Recommendation X.75;

b) the interworking function (IWF) provides conversion between signalling system X.71 or X.61, and X.75. During data transfer phase, and for telematic terminals mentioned in Recommendation T.70, the protocols defined in ¤¤ 3.3.2 and 3.3.3 of T.70 are used on CSPDN at layers 2 and 3; for other terminals on CSPDN, the application of these protocols or alternative protocols is possible.

Note 1 - In establishing international accounting principles in relation with this interworking arrangement, consideration should be given to the distribution of the functional elements involved in this interworking arrangement (e.g., cost/revenues of the IWF).

Note 2 - For any of the cases in ¤ 6.1, the Administrations involved may agree exceptionally that the interworking function or crossover point between the CSPDN and PSPDN be placed in a country different than the CSPDN.

The detailed procedures for interworking are defined in Recommendation X.82 (does not yet cover the X.61 case). In particular, the following applies:

6.1.1 *Transfer of addressing information*

For further study.

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

For further study.

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

For further study.

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

For further study.

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

For further study.

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

For further study.

6.1.7 *Arrangements for other facilities*

For further study.

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

These arrangements are as described in Recommendation X.302.

6.2 *Interworking by port access*

The interworking arrangement is illustrated in Figure 3/X.322.

Figure 3/X.322 - T0706760-88

The detailed procedures for interworking are defined in Recommendation X.32. In particular, the following applies:

6.2.1 *Transfer of addressing information*

These arrangements are described in Recommendation X.301.

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

These arrangements are described in Recommendation X.301.

6.2.3 *Arrangements for facilities relating to charging conditions applying to the call*

These arrangements are described in Recommendation X.301.

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

These arrangements are described in Recommendation X.301.

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

These arrangements are 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 described in Recommendation X.301.

6.2.7 *Arrangements for other facilities*

These arrangements are described in Recommendation X.301.

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

These arrangements are as described in Recommendation X.302.