INTERNATIONAL TELECOMMUNICATION UNION

ITU-T X.2

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

(03/93)

PUBLIC DATA NETWORKS: SERVICES AND FACILITIES

INTERNATIONAL DATA TRANSMISSION SERVICES AND OPTIONAL USER FACILITIES IN PUBLIC DATA NETWORKS AND ISDNs

ITU-T Recommendation X.2

(Previously “CCITT Recommendation”)

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation X.2 was revised by the ITU-T Study Group VII (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR, or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

© ITU 1993

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the ITU.

INTERNATIONAL DATA TRANSMISSION SERVICES AND OPTIONAL USER FACILITIES IN PUBLIC DATA NETWORKS AND ISDNs

(Geneva, 1972; amended at Geneva, 1976 and 1980; Malaga-Torremolinos, 1984; Melbourne, 1988 and Helsinki, 1993)

The CCITT,

considering

(a) the international user classes of service and categories of access defined in Recommendation X.1;

(b) the need to standardize data transmission services, optional user facilities and *DTE services*, in public data networks and ISDNs, which should be made available on an international basis;

(c) the need to standardize additional optional user facilities and *DTE services* which may be provided by Administrations and which may be available on an international basis;

(d) that the optional user facilities indicated in this Recommendation are defined in other Recommendations, for example Recommendation X.301 for network implementations, where appropriate, and Recommendations X.21, X.25, etc., for network procedures;

NOTE – Alignment and interworking between the facilities in this Recommendation and supplementary services in the I.250-Series Recommendations are described in Appendix III.

(e) the need to standardize the identification methods applicable to these *DTE services*, which identification methods should be made available on an international basis, and which identification methods may be provided by Administrations and may be available on an international basis;

(f) the impact which these optional user facilities and *DTE services* could have on tariff structures,

unanimously declares

1) that the optional user facilities should be standardized for each of the user classes of service indicated in Recommendation X.1 for each of the following:

i) circuit switched data transmission services;

ii) packet switched data transmission services;

iii) leased circuit data transmission services;

NOTE – Further study is necessary to establish whether the service and optional user facilities provided by ISDNs for circuit switched data transmission services are adequately defined in this Recommendation.

2) that the optional user facilities to be made available on an international basis are indicated in the following clauses. Some of the optional user facilities are available on a per-call basis and others may be assigned for an agreed contractual period. In all cases, the user has the option of requesting a given optional user facility;

3) that the DTE services and the relative identification methods used when the packet switched data transmission service is obtained via a Public Switched Telephone Network (PSTN), a Circuit Switched Public Data Network (CSPDN) or an Integrated Services Digital Network (ISDN) should also be standardized and are indicated in the following clauses.

1 Introduction

This Recommendation indicates the degree of support required for the capabilities associated with the data transmission services. In general, this degree of support can be expressed as one of the following:

E An Essential user or DTE service or facility to be made available internationally.

A An Additional user or DTE service or facility which may be available in certain data networks and may also be available internationally.

FS This item is for Further Study as to whether it will be supported at all in conjunction with one of the data transmission services.

– This item is not applicable.

In certain cases, the degree of support depends on the support of other services or facilities, or other aspects. This is indicated by adopting the following additional notation:

C_n Refers to a "conditional statement of support" given below the table in which C_n appears.

M Support for the user or DTE service or facility is Mandatory by an Administration but it may not be available internationally.

2 Circuit switched data transmission service

Table 1 indicates the optional user facilities which should be made available on an international basis in the circuit switched data transmission service and those facilities which may be available in certain data networks and may also be available internationally.

NOTE – The subject of interworking between the packet switching service and the circuit switching service is for further study.

3 Packet switched data transmission services

3.1 Dedicated connection to a packet switched data transmission service

Tables 2 and 3 indicate the services and the optional user facilities, respectively, which should be made available on an international basis in the packet switched data transmission service, and those which may be available on certain data networks and may also be available internationally in case of a direct connection to a packet switched data transmission service.

These services and optional user facilities are described in Recommendation X.25.

A DTE may make use of one or more of these services and facilities.

It should be noted that Recommendation X.25 has inherent features (e.g. the conveying of an address extension), which can be used end-to-end by users for providing an OSI network service (see Recommendations X.213 and X.223). Such features are described in Recommendation X.25 and are so-called "CCITT-defined DTE facilities" (see Annex G/X.25).

NOTES

1 The subject of interworking between the packet switching service and the circuit switching service is for further study.

2 The study of "connectionless services" is for further study.

TABLE 1/X.2

Optional user facilities in circuit switched data transmission service

	Optional user facility	All user classes of service
1	*Optional user facilities assigned for an agreed contractual period*	
1.1	Direct call	A
1.2	Closed user group	E
1.3	Closed user group with outgoing access	A
1.4	Closed user group with incoming access	A
1.5	Incoming calls barred within a closed user group	A
1.6	Outgoing calls barred within a closed user group	A
1.7	Calling line identification	A
1.8	Outgoing calls barred	A
1.9	Bilateral closed user group	A
1.10	Bilateral closed user group with outgoing access	A
1.11	Incoming calls barred	A
1.12	Reverse charging acceptance	A
1.13	Connect when free	A
1.14	Waiting allowed	A
1.15	Redirection of calls	A
1.16	On-line facility parameter registration/cancellation	A
1.17	DTE inactive registration/cancellation	A
1.18	Date and time indication	A
1.19	Hunt group	A
2	*Optional user facilities requested by the DTE on a per-call basis*	
2.1	Direct call	A
2.2	Abbreviated address calling	A
2.3	Multi-address calling (see Note)	A
2.4	Reverse charging	A
2.5	RPOA selection	A
2.6	Charging information	A
2.7	Called line identification	A
2.8	Closed user group selection	E
2.9	Bilateral closed user group selection	A

NOTE – This optional user facility also provides the user with the capability to request the establishment of a point-to-multipoint configuration amongst the following: centralized multipoint, decentralized multipoint, broadcasting.

TABLE 2/X.2

Services in packet switched data transmission service (dedicated connection)

	User classes of service		
	8-11, 26, 30-33, 35, 37, 45, 53 and 59	20-26	29
Virtual call service	E	E	E
Permanent virtual circuit service	E (Note)	FS	FS
NOTE – This service continues to be allocated an "E" classification. However, while some Administrations continue to believe that the offering of this service is an essential feature of the international service, other Administrations have expressed the view that they will not offer the service internationally. The international application depends on bilateral agreement. This service may not be available for the maritime mobile services.			

3.2 Switched connection to a packet switched data transmission service (user classes of service 20-26 and 29)

3.3 Switched connection to a packet switched data transmission service (classes of service 8–12, 26 and 30)

3.3.1 DTE services and identification methods

Table 6 indicates the *DTE services* and the relative *identification methods* which should be made available on an international basis with classes 8–12, 26 and 30 of the packet switched data transmission service when the service is accessed via a switched connection, and those which may be available in certain data networks and may also be available internationally in case of a switched connection to a packet switched data transmission service.

Permanent virtual circuits are not provided in the scope of 3.3.

The detailed definitions of the DTE services and the identification methods are contained in Recommendation X.32.

3.3.2 Facilities

For the *non-identified (dial-in-by-the-DTE)*, the *non-identified (dial-out-by-the-PSPDN)*, and the *identified DTE services*, the optional user facilities provided at the DTE/DCE interface are default values specified in Recommendation X.32.

For the customized DTE service, the optional user facilities which should be made available internationally, and those which may be available on certain data networks and may also be available internationally are indicated in Table 7.

TABLE 3/X.2

Facilities of packet switched data transmission service (dedicated connections)

	Optional user facility	User classes of service			
		8-11, 26, 30-33, 35, 37, 45, 53 and 59		20-26 (Note 1)	
		VC	PVC	VC	PVC
1	*Optional user facilities assigned for an agreed contractual period*				
1.1	Extended frame sequence numbering	C1	C1	–	–
1.2	Multilink procedure	A	A	–	–
1.3	On-line facility registration	A	–	FS	–
1.4	Extended packet sequence numbering (modulo 128)	A (Note 2)	A (Note 2)	–	–
1.5	D-bit modification	A	A	FS	–
1.6	Packet retransmission	A	A	–	–
1.7	Incoming calls barred	E	–	A	–
1.8	Outgoing calls barred	E	–	A	–
1.9	One-way logical channel outgoing	E	–	–	–
1.10	One-way logical channel incoming	A	–	–	–
1.11	Nonstandard default packet sizes 16, 32, 64, 256, 512,1024, 2048, 4096	C1	C1	FS	FS
1.12	Nonstandard default window sizes	A (Note 2)	A (Note 2)	–	–
1.13	Default throughput classes assignment	A	A	FS	FS
1.14	Flow control parameter negotiation	E	–	FS	–
1.15	Basic throughput class negotiation	E	–	FS	–
1.16	Extended throughput class negotiation	A	–	FS	–
1.17	Closed user group	E	–	E	–
1.18	Closed user group with outgoing access	A	–	A	–
1.19	Closed user group with incoming access	A	–	A	–
1.20	Incoming calls barred within a closed user group	A	–	A	–
1.21	Outgoing calls barred within a closed user group	A	–	A	–
1.22	Bilateral closed user group	A	–	A	–
1.23	Bilateral closed user group with outgoing access	A	–	A	–
1.24	Fast select acceptance	E	–	A	–
1.25	Reverse charging acceptance	A	–	A	–
1.26	Local charging prevention	A	–	FS	–
1.27	NUI subscription	A	–	A	–
1.28	NUI override	A	–	–	–
1.29	Charging information	A	–	A	–
1.30	RPOA subscription	A	–	A	–
1.31	Hunt group	A	–	A	–
1.32	Call redirection	A	–	FS	–
1.33	Call deflection subscription	A	–	–	–
1.34	TOA/NPI address subscription	FS	–	FS	–
1.35	Direct call	FS	–	A	–
1.36	Internetwork call redirection/deflection prevention subscription	A	–	–	–
1.37	Global alternative address registration	A	–	–	–
1.38	Interface specific alternative address registration	C2	–	–	–
1.39	Alternative address usage subscription	A	–	–	–
2	*Optional user facilities on a per-call basis*				
2.1	Flow control parameter negotiation	E	–	–	–
2.2	Basic throughput class negotiation	E	–	–	–

TABLE 3/X.2 *(end)*

Facilities of packet switched data transmission service (dedicated connections)

Optional user facility		User classes of service			
		8-11, 26, 30-33, 35, 37, 45, 53 and 59		20-26 (Note 1)	
		VC	PVC	VC	PVC
2.3	Extended throughput class negotiation	C3	–	–	–
2.4	Closed user group selection	E	–	E	–
2.5	Closed user group with outgoing access selection	C4	–	C3	–
2.6	Bilateral closed user group selection	C5	–	FS	–
2.7	Reverse charging	A	–	A	–
2.8	Fast select	E	–	A	–
2.9	NUI selection	C6	–	C5	–
2.10	Charging information	A	–	A	–
2.11	ROA selection	A	–	A	–
2.12	Call deflection selection	C7	–	–	–
2.13	Call redirection or call deflection notification	C8	–	FS	–
2.14	Called line address modified notification	E	–	FS	–
2.15	Transit delay selection and indication	E	–	–	–
2.16	Abbreviated address calling	–	–	A	–
2.17	Internetwork call redirection/deflection status selection	A	–	FS	–
2.18	Alternative address selection	C9	–	–	–

VC Applicable when the virtual call service is being used.

PVC Applicable when the permanent virtual circuit service is being used.

C1 The relationship among several parameters to be used for efficient line utilization is expressed as

$$R * D/8 \leq k * N1 \quad (1)$$

where R is transmission rate (bit/s);

D is total round trip delay (seconds);

k is Layer 2 window size; and

N1 is frame size (octets).

If a combination of variables k and N1 do not satisfy equation (1), then k, N1, or both should be increased. If (the values of k and/or N1 which satisfy the equation (1) are such that Extended Frame Sequence Numbering and/or Non-standard Default Packet Size (which, in turn, influences N1) are required), then one or both of these facilities are M; otherwise they are A.

C2 If (Alternative address usage subscription is offered), then M; otherwise prohibited.

C3 If (Extended throughput class negotiation for a contractual period is offered), then M; otherwise prohibited.

C4 If [(Closed user group with outgoing access or Closed user group with incoming access is offered] and [the network offers the capability of choosing whether to have a preferential CUG)], then M; otherwise prohibited.

C5 If (Bilateral closed user group or Bilateral closed user group with outgoing access offered), then M; otherwise prohibited.

C6 If (NUI subscription or NUI override is offered), then M; otherwise prohibited.

C7 If (Call deflection subscription is offered), the M; otherwise prohibited.

C8 If (Call redirection or Call deflection is offered), then M; otherwise A.

C9 If (Alternative address usage subscription is offered), then M; otherwise prohibited.

NOTES

1 The use of a PAD function is assumed for virtual call service (see Recommendation X.3). Its applicability for permanent virtual circuit service is for further study.

2 The relationship among parameters in Layer 3 for a single virtual circuit is similar to that given in equalitn (1) under condition C1. When a packet window size larger than 2 is needed to fully utilize a virtual circuit, then the non-standard default window size facility is required. If this window size is also larger than 7, then the extended packet sequence numbering facility is also required. The precise relationships for single and multiple logical channel cases is for further study.

TABLE 4/X.2

Services in packet switched data transmission service (switched connections)

	User classes of service	
	20-26	29
Virtual call service	E	E
Permanent virtual circuit service	FS	FS

TABLE 5/X.2

Facilities of packet switched data transmission service (switched connections)

Optional user facility		User classes of service			
		20-26 (Note)		29 (Note)	
		VC	PVC	VC	PVC
1	*Optional user facilities assigned for an agreed contractual period*				
1.1	Extended frame sequence numbering	–	–	–	–
1.2	Multilink procedure	–	–	–	–
1.3	On-line facility registration	FS	–	–	–
1.4	Extended packet sequence numbering (modulo 128)	–	–	–	–
1.5	D-bit modification	FS	–	FS	–
1.6	Packet retransmission	–	–	–	–
1.7	Incoming calls barred	A	–	A	–
1.8	Outgoing calls barred	A	–	A	–
1.9	One-way logical channel outgoing	–	–	–	–
1.10	One-way logical channel incoming	–	–	–	–
1.11	Nonstandard default packet sizes 16, 32, 64, 256, 512, 1024, 2048, 4096	FS	FS	A	FS
1.12	Nonstandard default window sizes	–	–	–	–
1.13	Default throughput classes assignment	FS	FS	FS	–
1.14	Flow control parameter negotiation	FS	–	FS	–
1.15	Basic throughput class negotiation	FS	–	FS	–
1.16	Extended throughput class negotiation	FS	–	FS	–
1.17	Closed user group	A	–	A	–
1.18	Closed user group with outgoing access	A	–	A	–
1.19	Closed user group with incoming access	A	–	A	–
1.20	Incoming calls barred within a closed user group	A	–	A	–
1.21	Outgoing calls barred within a closed user group	A	–	A	–
1.22	Bilateral closed user group	A	–	A	–
1.23	Bilateral closed user group with outgoing access	A	–	A	–
1.24	Fast select acceptance	A	–	–	–
1.25	Reverse charging acceptance	A	–	A	–
1.26	Local charging prevention	FS	–	FS	–
1.27	NUI subscription	A	–	A	–
1.28	NUI override	–	–	–	–
1.29	Charging information	A	–	A	–
1.30	ROA subscription	A	–	A	–

TABLE 5/X.2 (*end*)

Facilities of packet switched data transmission service (switched connections)

Optional user facility		User classes of service			
		20-26 (Note)		29 (Note)	
		VC	PVC	VC	PVC
1.31	Hunt group	A	–	A	–
1.32	Call redirection	FS	–	FS	–
1.33	Call deflection subscription	–	–	–	–
1.34	TOA/NPI address subscription	FS	–	FS	–
1.35	Direct call	A	–	A	–
1.36	Internetwork call redirection/deflection prevention subscription	FS	–	FS	–
2	*Optional user facilities on a per-call basis*				
2.1	Flow control parameter negotiation	–	–	–	–
2.2	Basic throughput class negotiation	–	–	–	–
2.3	Extended throughput class negotiation	–	–	–	–
2.4	Closed user group selection	C1	–	C1	–
2.5	Closed user group with outgoing access selection	C2	–	C2	–
2.5	Closed user group with outgoing access selection	C2	–	C2	–
2.6	Bilateral closed user group selection	FS	–	FS	–
2.7	Reverse charging	A	–	A	–
2.8	Fast select	A	–	–	–
2.9	NUI selection	C3	–	C3	–
2.10	Charging information	A	–	–	–
2.11	ROA selection	A	–	A	–
2.12	Call deflection selection	–	–	–	–
2.13	Call redirection or call deflection notification	FS	–	–	–
2.14	Called line address modified notification	A	–	–	–
2.15	Transit delay selection and indication	–	–	FS	–
2.16	Abbreviated address calling	A	–	A	–

VC Applicable when the virtual call service is being used.

PVC Applicable when the permanent virtual circuit service is being used.

C1 If (Closed user group is offered), then M; otherwise prohibited.

C2 If [(Closed user group with outgoing access or Closed user group with incoming access is offered) and (the network offers the capability of choosing whether to have a preferential CUG)] then M; otherwise prohibited.

C3 If (NUI subscription or NUI override is offered), then M; otherwise prohibited.

NOTE – The use of a PAD function is assumed for virtual call service (see Recommendations X.3 and X.5). Its applicability for permanent virtual circuit service is for further study.

TABLE 6/X.2

DTE services and identification methods

DTE services		User classes of service 8-12, 26 and 30	DTE identification				DCE identification		
			NO	PSN	XID	NUI	NO	PSN	XID
1 Non-identified (dial-in-by-the-DTE)		A/E (Note 1)	X (Note 1)				X		X
2 Non-identified (dial-out-by-the-PSPDN)		A	X				X	X	X
3 Identified	Dial-in-by-the-DTE	A/E (Note 1)		X (Note 1)	X	X	X		X
	Dial-out-by-the-PSPDN			X			X		
4 Customized (Note 2)	Dial-in-by-the-DTE	A		X	X		X		X
	Dial-out-by-the-PSPDN			X	X		X	X	X

NO No identification.

PSN Identification provided by Public Switched Network.

XID Identification provided by means of the data link layer XID procedure.

NUI Identification provided by means of the *NUI selection* facility.

PSPDN Packet Switched Public Data Network.

X DTE or DCE identification method which can be provided by the network when it provides the corresponding *DTE service*.

NOTES

1 An Administration providing a switched connection to a packet switched data transmission service for classes of service 8-12, 26 and 30 should provide at least the *non-identified DTE service (dial-in-by-the-DTE)* with no DTE identification method or the *identified DTE service (dial-in-by-the-DTE)* with the provided-by-PSN DTE identification method.

2 The *customized DTE service* is one *DTE service* for which dial-out-by-the-PSPDN may be provided or not provided. However, the possible identification methods are different for dial-in-by-the-DTE and dial-out-by-the-PSPDN.

TABLE 7/X.2

Facilities of packet switched data transmission service for customized DTE service

Optional user facility		User classes of service 8-12, 26 and 30
1	*Optional user facilities assigned for an agreed contractual period*	
1.1	Extended frame sequence numbering	C1
1.2	Multilink procedure	FS
1.3	On-line facility registration	A
1.4	Extended packet sequence numbering (modulo 128)	A (Note)
1.5	D-bit modification	A
1.6	Packet retransmission	A
1.7	Incoming calls barred	E
1.8	Outgoing calls barred	E
1.9	One-way logical channel outgoing	E
1.10	One-way logical channel incoming	C1
1.11	Nonstandard default packet sizes 16, 32, 64, 256, 512, 1024, 2048, 4096	A (Note)
1.12	Nonstandard default window sizes	A
1.13	Default throughput classes assignment	A
1.14	Flow control parameter negotiation	E
1.15	Basic throughput class negotiation	E
1.16	Extended throughput class negotiation	A
1.17	Closed user group	E
1.18	Closed user group with outgoing access	A
1.19	Closed user group with incoming access	A
1.20	Incoming calls barred within a closed user group	A
1.21	Outgoing calls barred within a closed user group	A
1.22	Bilateral closed user group	A
1.23	Bilateral closed user group with outgoing access	A
1.24	Fast select acceptance	E
1.25	Reverse charging acceptance	A
1.26	Local charging prevention	A
1.27	NUI subscription	A
1.28	NUI override	A
1.29	Charging information	A
1.30	ROA subscription	A
1.31	Hunt group	A
1.32	Call redirection	A
1.33	Call deflection subscription	A
1.34	TOA/NPI address subscription	FS
1.35	Direct call	FS
1.36	Internetwork call redirection/deflection prevention subscription	A
1.37	Global alternative address registration	A
1.38	Interface specific alternative address registration	C2
1.39	Alternative address usage subscription	A
2	*Optional user facilities on a per-call basis*	
2.1	Flow control parameter negotiation	E
2.2	Basic throughput class negotiation	E
2.3	Extended throughput class negotiation	C3
2.4	Closed user group selection	E
2.5	Closed user group with outgoing access selection	C4
2.6	Bilateral closed user group selection	C5
2.7	Reverse charging	A

TABLE 7/X.2 *(end.)*

Facilities of packet switched data transmission service for customized DTE service

Optional user facility		User classes of service 8-12, 26 and 30
2.8	Fast select	E
2.9	NUI selection	C6
2.10	Charging information	A
2.11	ROA selection	A
2.12	Call deflection selection	C7
2.13	Call redirection or call deflection notification	C8
2.14	Called line address modified notification	E
2.15	Transit delay selection and indication	E
2.16	Internetwork call redirection/deflection status selection	A
2.17	Alternative address selection	C9
3	*X.32 optional user facilities*	
3.1	Secure dial-back	A

C1 The relationship among several parameters to be used for efficient line utilization is expressed as

$$R * D/8 \leq k * N1 \quad (1)$$

where R is transmission rate (bit/s);

D is total round trip delay (seconds);

k is Layer 2 window size; and

N1 is frame size (octets).

If a combination of variables k and N1 do not satisfy equation (1), then k, N1, or both should be increased. If (the values of k and/or N1 which satisfy the equation (1) are such that Extended Frame Sequence Numbering and/or Non-standard Default Packet Size (which, in turn, influences N1) are required), then one or both of these facilities are M; otherwise they are A.

C2 If (alternative address usage subscription is offered), then M; otherwise prohibited.

C3 If (extended throughput class negotiation for a contractual period is offered), then M; otherwise prohibited.

C4 If [(Closed user group with outgoing access or Closed user group with incoming access is offered) and (the network offers the capability of choosing whether to have a preferential CUG)] then M; otherwise prohibited.

C5 If (Bilateral closed user group or Bilateral closed user group with outgoing access is offered), then M; otherwise prohibited.

C6 If (NUI subscription or NUI override is offered), then M; otherwise prohibited.

C7 If (Call deflection subscription is offered), then M; otherwise prohibited.

C8 If (Call redirection or Call deflection is offered), then M; otherwise A.

C9 If (alternative address usage subscription is offered), then M; otherwise prohibited.

NOTE – The relationship among parameters in Layer 3 for a single virtual circuit is similar to that given in equation (1) under condition C1. When a packet window size larger than 2 is needed to fully utilize a virtual circuit, then the non-standard default window size facility is required. If this window size is also larger than 7, then the extended packet sequence numbering facility is also required. The precise relationships for single and multiple logical channel cases is for further study.

4 Leased circuit data transmission services

Table 8 indicates the optional user facilities which should be made available on an international basis with the leased circuit data transmission services and those which may be available in certain data networks and may also be available internationally.

TABLE 8/X.2

Facilities of leased circuit data transmission service

Optional user facility	User classes of service	
	1-2	3-7
1 Point to point	E	E
2 Multipoint		
2.1 Centralized multipoint	A	A
2.2 Decentralized multipoint	A	A
2.3 Broadcasting	A	A

Appendix I

(to Recommendation X.2)

(This appendix does not form an integral part of this Recommendation)

Recommendation X.25 uses facility codes in the facility field of call set-up and clearing packets, and registration codes in the registration field of registration packets. Recommendation X.32 uses X.32 identification protocol elements in the user data field of the XID frames. Recommendation X.75 uses utility codes in the utility field of call set-up and clearing packets.

The principles for the encoding of these codes (i.e. class A, B, C or D, depending on the length of the parameter following the code) are described in Recommendations X.25 and X.75.

As far as possible, the same code is used in several contexts only when it has an equivalent semantic. However, due to historical reasons, this is not always the case.

Table I.1 gives the list of the various codes used in these Recommendations.

TABLE I.1/X.2

Coding of the facility, registration, protocol element and utility codes

Code Bits 8 7 6 5 4 3 2 1	X.25 fac	X.25 dte	X.25 reg	X.32	X.75	
CLASS A						
0 0 0 0 0 0 0 0	X	X	X	X	X	Marker
0 0 0 0 0 0 0 1	X				 X	Fast select and/or reverse charging and/or internetwork call redirection/deflection status selection Fast select and/or reverse charging indication
0 0 0 0 0 0 1 0	X		 X		 X	Basic throughput class negotiation Default throughput classes assignment (basic format) Basic throughput class indication
0 0 0 0 0 0 1 1	X				 X	Closed user group selection (basic format) Traffic class indication
0 0 0 0 0 1 0 0	X					Charging information (requesting service)
0 0 0 0 0 1 0 1			X			Facilities that may be negotiated only when all logical channels used for virtual calls are in state p1
0 0 0 0 0 1 1 0			X			Non-negotiable facilities values
0 0 0 0 0 1 1 1				X	 X	Diagnostic element Tariffs
0 0 0 0 1 0 0 0	X				X	Called line address modified notification
0 0 0 0 1 0 0 1	X					Closed user group with outgoing access selection (basic format)
0 0 0 0 1 0 1 0		X				Quality of service negotiation: minimum throughput class (basic format)
0 0 0 0 1 0 1 1		X				Expedited data negotiation
0 0 0 0 1 1 0 0 to 0 0 1 1 1 1 1 1						Unused
CLASS B						
0 1 0 0 0 0 0 0						Unused
0 1 0 0 0 0 0 1	X				 X	Bilateral closed user group selection Transit network identification
0 1 0 0 0 0 1 0	X		 X		 X	Flow control parameter negotiation (packet size) Non-standard default packet sizes Packet size indication
0 1 0 0 0 0 1 1	X		 X		 X	Flow control parameter negotiation (window size) Non-standard default window sizes Window size indication

TABLE I.1/X.2 *(continued)*

Coding of the facility, registration, protocol element and utility codes

Code Bits 8 7 6 5 4 3 2 1	X.25 fac	X.25 dte	X.25 reg	X.32	X.75	
0 1 0 0 0 1 0 0	X				 X	RPOA selection (basic format) RPOA selection
0 1 0 0 0 1 0 1			X			Facilities that may be negotiated at any time
0 1 0 0 0 1 1 0			X			Availability of facilities
0 1 0 0 0 1 1 1	X					Closed user group selection (extended format)
0 1 0 0 1 0 0 0	X					Closed user group with outgoing access selection (extended format)
0 1 0 0 1 0 0 1	X				 X	Transit delay selection and indication Transit delay indication
0 1 0 0 1 0 1 0					X	Clearing network identification code
0 1 0 0 1 0 1 1					X	Transit delay selection
0 1 0 0 1 1 0 0	X		 X		 X	Extended throughput class negotiation Default throughput classes assignment (extended format) Extended throughput class indication
0 1 0 0 1 1 0 1		X				Quality of Service negotiation: minimum throughput class (extended format)
0 1 0 0 1 1 1 0 to 0 1 0 1 1 1 1 1						Unused
0 1 1 0 0 0 0 0						Reference number (see Note)
0 1 1 0 0 0 0 1 to 0 1 1 1 1 1 1 1						Unused
CLASS C						
1 0 0 0 0 0 0 0						Unused
1 0 0 0 0 0 0 1					X	Call identifier
1 0 0 0 0 0 1 0 to 1 0 1 1 1 1 1 1						Unused
CLASS D						
1 1 0 0 0 0 0 0						Unused
1 1 0 0 0 0 0 1	X					Charging information (call duration)
1 1 0 0 0 0 1 0	X					Charging information (segment count)
1 1 0 0 0 0 1 1	X				 X	Call redirection or call deflection notification Closed user group indication
1 1 0 0 0 1 0 0	X					RPOA selection (extended format)

TABLE I.1/X.2 *(end)*

Coding of the facility, registration, protocol element and utility codes

Code Bits 8 7 6 5 4 3 2 1	X.25 fac	X.25 dte	X.25 reg	X.32	X.75	
1 1 0 0 0 1 0 1	X					Charging information (monetary unit)
1 1 0 0 0 1 1 0	X				 X	NUI selection NUI
1 1 0 0 0 1 1 1					X	Closed user group with outgoing access indication
1 1 0 0 1 0 0 0			X			Logical channel types ranges
1 1 0 0 1 0 0 1		X				Called address extension
1 1 0 0 1 0 1 0		X				Quality of service negotiation: end-to-end transit delay
1 1 0 0 1 0 1 1		X				Calling address extension
1 1 0 0 1 1 0 0				X		Identity element
1 1 0 0 1 1 0 1				X		Signature element
1 1 0 0 1 1 1 0				X		Random number element
1 1 0 0 1 1 1 1				X		Signed response element
1 1 0 1 0 0 0 0						Unused
1 1 0 1 0 0 0 1	X				 X	Call deflection selection Call redirection or call deflection selection
1 1 0 1 0 0 1 0		X				Quality of service negotiation: priority
1 1 0 1 0 0 1 1		X				Quality of service negotiation: protection
1 1 0 1 0 1 0 0					X	Call redirection or call deflection notification
1 1 0 1 0 1 0 1 to 1 1 1 1 1 1 1 0						Unused
1 1 1 1 1 1 1 1	X	X	X	X	X	Reserved for extension

X.25 fac: code used in the facility field of X.25 call set-up and/or clearing packets for X.25 facilities.

X.25 dte: code used in the facility field of X.25 call set-up and/or clearing packets for CCITT-defined DTE facilities.

X.25 reg: code used in the registration field of registration packets.

X.32: code defined in Recommendation X.32 and used in the user data field of the XID frames.

X.75: code defined in Recommendation X.75 and used in the utility field of the call set-up and/or clearing packets.

NOTE – This value is reserved for ISO/IEC 8208.

Appendix II

(to Recommendation X.2)

(This appendix does not form an integral part of this Recommendation)

CCITT Recommendation X.25 and ISO/IEC 8208 provide for a mechanism to differentiate between user data and control information being sent while in data transfer state. This mechanism is used with the user data field to distinguish between the two types of information. The use of the Q bit is optional.

To use this mechanism an indicator in the data packet header called the Qualifier bit (Q bit) is used (see 4.3.6/X.25). When used, the transmitting DTE sets the Q bit so as to have the same value (i.e. 0 or 1) in all data packets of the same complete packet sequence. The complete packet sequence will be delivered to the distant DTE as a complete packet sequence having the Q bit set in all packets to the value assigned by the transmitting DTE.

When used, the information distinguished by the Q bit sequences is handled based upon the procedures outlined in the relevant Recommendation or Standard. The procedures which utilize Q bit sequences have certain common characteristics. Those known are presented here with the goal of assisting protocol developers and simplifying network management and test equipment.

Current uses of the Q bit sequences operate under the assumption of exclusivity. That is, only one application of the Q bit sequence is in effect on the specific virtual circuit for the duration of the call. It has been considered that some future implementations might desire multiple concurrent operation with the existing protocols; sharing the use of Q bit sequences over the same virtual circuit. This could cause some confusion.

At this point, all existing uses of the Q bit mechanism implement it with the encoding of the first octet of the complete packet sequence. This first octet is known as the control identifier field (see 4.4.1/X.29). Known standardization of the use of the Q bit mechanism and the related first octets are listed in Table II.1.

The second octet is used in the CCITT Recommendations to transmit additional information specific to the message type. This may require one or more additional octets (see 4.4.3/X.29 and 4.4.3/X.39). ISO/IEC 8878 Annex A utilizes the second octet to signal the message type.

TABLE II.1/X.2

Q bit control identifier standardization

Application	First Octet									
	Bits	8	7	6	5		4	3	2	1	
ISO/IEC											
8878 Annex A (OSI CONS over X.25 (1980 and before)		0	0	1	0		0	0	0	0	
CCITT (Note 1)											
PAD Control:											
X.29 PAD		0	0	0	0		X	X	X	X	(Note 2)
X.39 PAD		0	0	0	1		X	X	X		(Note 2)
Reserved for additional PADs		0	0	1	0						
Reserved for additional PADs		0	0	1	1						
Service Extension:											
Telematic Service		0	1	0	0		X	X	X	X	(Note 2)
Reserved for additional services		0	1	0	1						
Reserved for additional services		0	1	1	0						
Reserved for additional services		0	1	1	1						
Private Extensions:											
Reserved for Private Use		1	0	0	0						
All values (inclusive) above											

NOTES

1 The extension of the control identifier field is subject to further study as presented in Note 2 of 4.4.1/X.29.

2 Bits 4, 3, 2 and 1 are used in the CCITT procedures to signal the message types (see Tables 2/X.29 and 2/X.39).

Appendix III

(to Recommendation X.2)

Relationship of ISDN (I.25x) Supplementary Services and X.2 Optional User Facilities

(This appendix does not form an integral part of this Recommendation)

III.1 Introduction

A study of the relationship between ISDN Supplementary Services and X.2 Optional User Facilities has been performed. This appendix reflects the preliminary results of the study.

In X.31, two methods for accessing packet switched data transmission services via ISDN are defined: Case A and Case B. In both cases, two connection types are available: on-demand and semi-permanent connection. For all the cases three kinds of relationship between ISDN Supplementary Services and X.2 Optional User Facilities are identified:

1) they operate independently;

2) there is a minimum relationship between them;

3) there is a maximum relationship which implies that alignment between ISDN Supplementary Services and X.2 Optional User Facilities is desirable.

The situations will be described in the following three subclauses. In III.4, a methodology for the alignment of ISDN Supplementary Services and X.2 Optional User Facilities is given. This appendix concludes with a table which gives a summary of the situation.

III.2 Independent operation

This situation refers to the on-demand X.31 Case A. From the point of view of an X.25 DTE connected to an ISDN, two sets of additional capabilities need to be considered. The availability of two sets of additional capabilities is similar to existing capabilities in public data networks where a circuit switched network, instead of an ISDN, can be used to access a PSPDN. This creates what might be viewed as "two-stage" enhancement to the basic X.25 virtual circuit service. This means that ISDN Supplementary Services as well as X.2 Optional User Facilities can operate independently, but may have impact on each other (e.g. Closed User Group in ISDN for CMBS and X.2 Closed User Group).

The ISDN Supplementary Services which require no signalling can also be used independently for on-demand Cases A and B, because no signalling is needed to activate these kind of ISDN Supplementary Services.

III.3 Minimum relationship

This situation refers to the on-demand Case B and semi-permanent Cases A and B, whereby the set of ISDN Supplementary Services that need signalling does not apply. The reason is that there is no mechanism for signalling an ISDN Supplementary Service in all three cases. On the other hand, the X.2 Optional User Facilities are applicable to the above three cases.

III.4 Maximum relationship

This situation refers to the on-demand Case B, whereby alignment between ISDN Supplementary Services and X.2 Optional User Facilities is desirable.

From the point of view of an integrated ISDN voice/data terminal, it would be desirable that the “Supplementary Services” available on an end-to-end basis for voice and data be the same, to the extent that it makes sense. For example, Closed User Group should operate the same way for voice and data; on the other hand, there is no need to introduce an ISDN Supplementary Service for non-standard Default Packet Size for circuit-switched voice since this makes no sense. In a similar fashion, one may not need to introduce an X.2 Optional User Facility equivalent to Calling Line Identification Presentation since this is the normal mode of operation for packet mode calls.

The above implies that one should try to make X.2 Optional User Facilities for X.31 packet mode data calls and ISDN Supplementary Services for non data calls operate identically, where both already exist and it makes sense to do so. Where a capability was lacking in either ISDN Supplementary Services or X.2 Optional User Facilities, it may be necessary to add a new capability to the appropriate Recommendations.

A methodology to achieve the alignment is given as follows:

1) For each X.2 Optional User Facility, identify if a similar ISDN Supplementary Service exists.
   - In case of no similarity, a new ISDN Supplementary Service is defined if the service is feasible.
   - In case of similarity, identify if the services provided are equivalent.
     - If they are equivalent, no changes are made to the X.2 Optional User Facility or the ISDN Supplementary Service.
     - In case they are not equivalent, the alignment procedure outlined below is followed.
2) For each ISDN Supplementary Service not covered by step 1, repeat the above procedure in step 1 for similarity with an X.2 Optional User Facility.

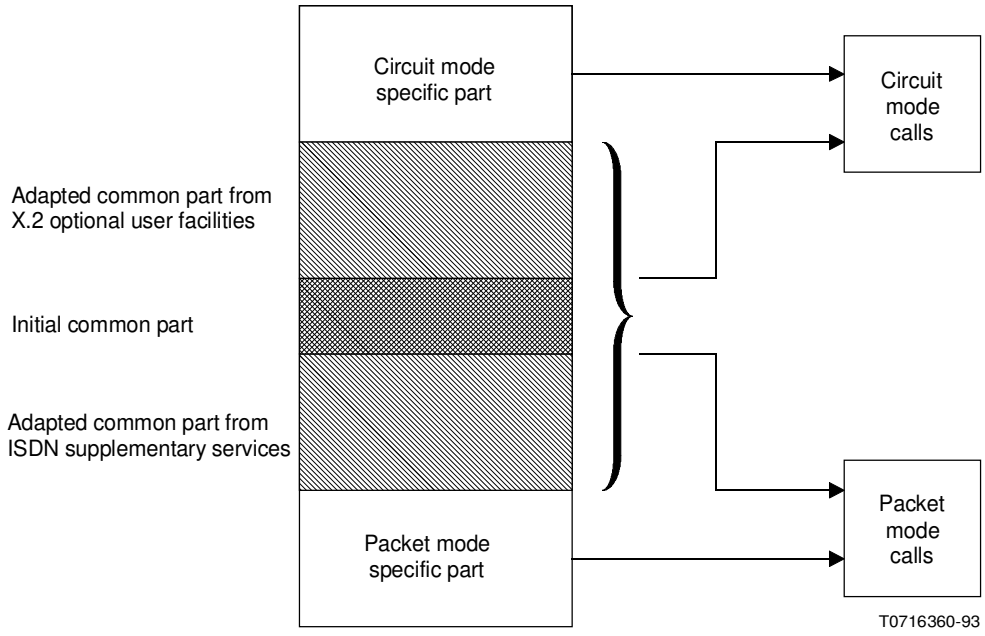
3) Alignment Procedure:

a) Identify the common part in the definition of an ISDN Supplementary Service and an X.2 Optional User Facility.

b) If an ISDN Supplementary Service has more options compared to an X.2 Optional User Facility, an attempt is made to include these options into the X.2 Optional User Facility. These options are then added to the common part of the definition. The options which cannot be adapted will apply only to circuit mode calls.

c) If an X.2 Optional User Facility has more options compared to an ISDN Supplementary Service, an attempt is made to include these options into the ISDN Supplementary Service. These options are then added to the common part of the definition. The options which cannot be adapted will apply only to packet mode calls.

The above method is illustrated in the following diagram:



A first attempt to apply this algorithm for alignment is given in Table III.1.

TABLE III.1/X.2

Comparison of ISDN supplementary services and X.2 optional user facility

ISDN supplementary services for non-data calls	Similar X.2 optional user facilities on data calls	Comments
Advice of Charge – at the end of the call – during the call – at call set up time	Charging Information – at the end of the call – –	
Conference Call	Multicast Service	
Completion of Calls to busy Subscribers	–	
Credit Call Calling	–	
Call Forwarding busy Call Forwarding Unconditional Call Forwarding No Reply	Call Redirection (Busy) Call Redirection (Systematic)	The definition of both services (Call Forwarding and Call Redirection) are not identical
Calling Line Identification Presentation	–	Default in X.25
Calling Line Indentification Restriction	–	May be useful in X.25
Connected Line Identification Presentation	–	Default in X.25
Connected Line Identification Restriction	–	May be useful in X.25
Call Deflection	Call Deflection	
Call Waiting	–	
Direct Dialling In	–	Default in X.25
Line Hunting	Hunt Group	
Multiple Subscriber Number	–	A part of basic service in many networks
Three Party Service	Multicast Service	
User-to-User Signalling * Service 1: during set-up and clearing phases within call control messages	Fast Select * during set-up and clearing phases of virtual calls	
* Service 2: during set-up phase of call, independently of call control messages	* Fast Select with restricted response	
* Service 3: during the active phase of a call	* By using Q-bit in data packet	

TABLE III.1/X.2 *(end)*

Comparison of ISDN supplementary services and X.2 optional user facility

ISDN supplementary services for non-data calls	Similar X.2 optional user facilities on data calls	Comments
Reverse charging	Reverse charging	
–	Incoming calls barred	May be useful for non-data calls
–	Outgoing Calls Barred	May be useful for non-data calls
Subaddressing	Address Extension Facility	
–	Local Charging Prevention	May be useful for non-data calls
–	Recognized Operating Agencies (ROA) related facilities	Idem
–	Called Line Address Modified Notification	Idem
–	Transit delay selection and indication	Idem
–	Alternative addressing	Idem
–	Internetwork call redirection Prevention Control	Idem

III.5 Summary

Table III.2 summarizes all the situations.

TABLE III.2

Overview of the relationship of ISDN Supplementary Services and X.2 Optional User Fa

Configuration	ISDN bearer service	ISDN Connection type	Applicability of:		
			ISDN SS		X.
			with signalling	without signalling	
1) Two ISDN non-data terminals	CMBS	On-demand B-channel Semi-permanent B-channel	Yes No	Yes No	
2) Two ISDN data terminals	CMBS	On-demand B-channel Semi-permanent B-channel	Yes No	Yes No	
3) X.25 DTE accessing PSPDN through ISDN (X.31 Case A)	CMBS	On-demand B-channel Semi-permanent B-channel	Yes No	Yes No	
4) X.25 DTE accessing ISDN packet switched data transmission service (X.31 Case B)	PMBS	On-demand B-channel Semi-permanent B-channel (On-demand) D-channel	No No No	Yes No Yes	
5) Integrated ISDN voice/data terminal accessing circuit/packet mode (X.31 Case B) service	voice: CMBS data: PMBS	On-demand B-channel Semi-permanent B-channel On-demand B-channel Semi-permanent B-channel (On-demand) D-channel	Yes No No No No	Yes No Yes No Yes	
NOTE – The independent case is valid for the case when ISDN Supplementary Services for addressing purposes are used.					

– Not applicable

X Applicable

SS Supplementary Service

OUF Optional User Facility

CMBS Circuit Mode Bearer Services

PMBS Packet Mode Bearer Services