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ITU-T

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X.2
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SERIES X: DATA NETWORKS AND OPEN SYSTEM COMMUNICATION

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»)

ITU-T X-SERIES RECOMMENDATIONS

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For further details, please refer to ITU-T List of Recommendations.

FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (ITU). 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, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

ITU-T Recommendation X.2 was revised by ITU-T Study Group 7 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 5 th of October 1996.

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NOTE

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

Superseded by a more recent version

CONTENTS

Superseded by a more recent version

SUMMARY

The new version of this Recommendation includes optional user facilities for frame relay data transmission service. Concept of port and direct accesses is involved. The applicability of some optional user facilities for all data transmission services is reviewed in accordance with the amendments of other X-Series Recommendations.

Recommendation X.2

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; revised in 1996)

The ITU-T,

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 II.

(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;

    iv)   frame relay data transmission services;

(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), an Integrated Services Digital Network (ISDN) and a PDN providing frame relay data transmission service should also be standardized and are indicated in the following clauses.

Superseded by a more recent version

1 Introduction

1.1 optional user facility: Is a facility which modifies or complements the basic data transmission service. Consequently, it cannot be offered to a user as stand-alone service. It must be offered together or in association with a data transmission service. An optional user facility may be applicable to a number of data transmission services.

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.

Definitions of particular optional user facilities are contained in Recommendation X.7.

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 provided by a CSPDN and those facilities which may be available in certain data networks and may also be available internationally.

3 Packet switched data transmission services

3.1 Direct access 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 access 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.

Some of optional user facilities in multicast service have another role (see Table 8).

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

Superseded by a more recent version

TABLE 1/X.2

**Optional user facilities in circuit switched data transmission service
provided by a CSPDN**

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 Call redirection	A
1.16 On-line facility registration	A
1.17 DTE inactive registration/cancellation	A
1.18 Date and time indication	A
1.19 Hunt group	A
1.20 Manual answer	
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 (Note)	A
2.4 Reverse charging	A
2.5 ROA[a] 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
[a] ROA Recognized Operating Agency (previously "recognized private operating agency") 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
(direct access) provided by a PSPDN**

Type of Service	User classes of service		
	8-11, 26 (synchronous mode), 30-61	20-26 (start-stop mode)	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.			

TABLE 3/X.2

**Facilities of packet switched data transmission service
(direct access) provided by a PSPDN**

Optional user facility	User classes of service			
	8-11, 26 (synchronous mode), 30-61		20-26 (start-stop mode) (Note 1)	
	VC	PVC	VC	PVC
1. *Optional user facilities assigned for an agreed contractual period*				
1.1 Extended frame sequence numbering (modulo 128)	C1	C1	–	–
1.2 Super-extended frame sequence numbering (modulo 32768)	C1	C1	–	–
1.3 Multilink procedure	A	A	–	–
1.4 Extended packet sequence numbering (modulo 128)	A (Note 2)	A (Note 2)	–	–
1.5 Super extended packet sequence numbering (modulo 32768)	A (Note 2)	A (Note 2)	–	–
1.6 D-bit modification	A	A	FS	–
1.7 Packet retransmission	A	A	–	–
1.8 Incoming calls barred	E	–	A	–
1.9 Outgoing calls barred	E	–	A	–
1.10 One-way logical channel outgoing	E	–	–	–
1.11 One-way logical channel incoming	A	–	–	–
1.12 Non-standard default packet sizes (16, 32, 64, 256, 512,1024, 2048, 4096)	C1	C1	FS	FS
1.13 Non-standard default window sizes	A (Note 2)	A (Note 2)	–	–
1.14 Default throughput classes assignment	A	A	FS	FS
1.15 Flow control parameter negotiation	E	–	FS	–
1.16 Basic throughput class negotiation	E	–	FS	–

TABLE 3/X.2 (*cont.*)

**Facilities of packet switched data transmission service
(direct access) provided by a PSPDN**

| Optional user facility | | User classes of service | | | |
| | | 8-11, 26 (synchronous mode), 30-61 | | 20-26 (start-stop mode) (Note 1) | |
		VC	PVC	VC	PVC
1.17	Extended throughput class negotiation	A	–	FS	–
1.18	Closed user group	E	–	E	–
1.19	Closed user group with outgoing access	A	–	A	–
1.20	Closed user group with incoming access	A	–	A	–
1.21	Incoming calls barred within a closed user group	A	–	A	–
1.22	Outgoing calls barred within a closed user group	A	–	A	–
1.23	Bilateral closed user group	A	–	A	–
1.24	Bilateral closed user group with outgoing access	A	–	A	–
1.25	Fast select acceptance	E	–	A	–
1.26	Reverse charging acceptance	A	–	A	–
1.27	Local charging prevention	A	–	FS	–
1.28	NUI subscription	A	–	A	–
1.29	NUI override	A	–	–	–
1.30	Charging information	A	–	A	–
1.31	ROA subscription	A	–	A	–
1.32	Hunt group	A	–	A	–
1.33	Call redirection	A	–	FS	–
1.34	Call deflection subscription	A	–	–	–
1.35	TOA/NPI address subscription	A, E (Note 3)	–	A, E (Note 3)	–
1.36	Direct call	FS	–	A	–
1.37	Internetwork call redirection/deflection prevention subscription	A	–	–	–
1.38	Global alternative address registration	A	–	–	–
1.39	Interface specific alternative address registration	C2	–	–	–
1.40	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	–	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	–

TABLE 3/X.2 (*concluded*)

**Facilities of packet switched data transmission service
(direct access) provided by a PSPDN**

Optional user facility	User classes of service			
	8-11, 26 (synchronous mode), 30-61		20-26 (start-stop mode) (Note 1)	
	VC	PVC	VC	PVC
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:

$$R * D/8 \leq k * N1 \tag{1}$$

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), 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

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 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 are for further study.

3   A before 2359 hours UTC, 31 December 2000, E after that time.

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

NOTE – A definition of "port access" is given in Recommendation X.1.

Tables 4 and 5 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.

TABLE 4/X.2

**Services in packet switched data transmission service
(port access) provided by a PSPDN**

Type of service	User classes of service	
	20-26 (start-stop mode)	29
Vitual call service	E	E
Permanent virtual circuit service	FS	FS

TABLE 5/X.2

**Facilities of packet switched data transmission service
(port access) provided by a PSPDN**

Optional user facility	User classes of service (Note 1)			
	20-26 (start-stop mode)		29	
	VC	PVC	VC	PVC
1 *Optional user facilities assigned for an agreed contractual period*				
1.1 On-line facility registration	FS	–	–	–
1.2 D-bit modification	FS	–	FS	–
1.3 Incoming calls barred	A	–	A	–
1.4 Outgoing calls barred	A	–	A	–
1.5 Nonstandard default packet sizes (16, 32, 64, 256, 512, 1024, 2048, 4096)	FS	FS	A	FS
1.6 Default throughput classes assignment	FS	FS	FS	–
1.7 Flow control parameter negotiation	FS	–	FS	–
1.8 Basic throughput class negotiation	FS	–	FS	–
1.9 Extended throughput class negotiation	FS	–	FS	–
1.10 Closed user group	A	–	A	–
1.11 Closed user group with outgoing access	A	–	A	–
1.12 Closed user group with incoming access	A	–	A	–

TABLE 5/X.2 (*cont.*)

**Facilities of packet switched data transmission service
(port access) provided by a PSPDN**

Optional user facility		User classes of service (Note 1)			
		20-26 (start-stop mode)		29	
		VC	PVC	VC	PVC
1.13	Incoming calls barred within a closed user group	A	–	A	–
1.14	Outgoing calls barred within a closed user group	A	–	A	–
1.15	Bilateral closed user group	A	–	A	–
1.16	Bilateral closed user group with outgoing access	A	–	A	–
1.17	Fast select acceptance	A	–	–	–
1.18	Reverse charging acceptance	A	–	A	–
1.19	Local charging prevention	FS	–	FS	–
1.20	NUI subscription	A	–	A	–
1.21	Charging information	A	–	A	–
1.22	ROA subscription	A	–	A	–
1.23	Hunt group	A	–	A	–
1.24	Call redirection	FS	–	FS	–
1.25	TOA/NPI address subscription	A, E, (Note 2)	–	A, E, (Note 2)	–
1.26	Direct call	A	–	A	–
1.27	Internetwork call redirection/deflection prevention subscription	FS	–	FS	–
2	*Optional user facilities on a per-call basis*				
2.1	Closed user group selection	C1	–	C1	–
2.2	Closed user group with outgoing access selection	C2	–	C2	–
2.3	Bilateral closed user group selection	FS	–	FS	–
2.4	Reverse charging	A	–	A	–
2.5	Fast select	A	–	–	–
2.6	NUI selection	C3	–	C3	–
2.7	Charging information	A	–	–	–
2.8	ROA selection	A	–	A	–
2.9	Call redirection or call deflection notification	FS	–	–	–
2.10	Called line address modified notification	A	–	–	–
2.11	Transit delay selection and indication	–	–	FS	–
2.12	Abbreviated address calling	A	–	A	–

TABLE 5/X.2 (*cont.*)

**Facilities of packet switched data transmission service
(port access) provided by a PSPDN**

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

NOTES

1   The use of a PAD function is assumed for virtual call service (see Recommendations X.3, X.5 and X.8). Its applicability for permanent virtual circuit service is for further study.

2   See Note 3 to Table 3.

3.3 Port access to a packet switched data transmission service (user 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 an intermediate switched network, and those which may be available in certain data networks and may also be available internationally in case of a port access 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.

TABLE 6/X.2

DTE services and identification methods

DTE services		User classes of service 8-12, 26 (synchronous mode) 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		

TABLE 6/X.2 (*concluded*)

DTE services and identification methods

DTE services		User classes of service 8-12, 26 (synchronous mode) and 30	DTE identification				DCE identification		
			NO	PSN	XID	NUI	NO	PSN	XID
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 port access 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. However, the possible identification methods are different for dial-in-by-the-DTE and dial-out-by-the-PSPDN.

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 7/X.2

Facilities of packets switched data transmission service for customized DTE service

Optional user facility		User classes of service 8-12, 26 (synchronous mode) 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	Extended packet sequence numbering (modulo 128)	A (Note 1)
1.4	D-bit modification	A

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

Facilities of packets switched data transmission service for customized DTE service

	Optional user facility	User classes of service 8-12, 26 (synchronous mode) and 30
1.5	Packet retransmission	A
1.6	Incoming calls barred	E
1.7	Outgoing calls barred	E
1.8	One-way logical channel outgoing	E
1.9	One-way logical channel incoming	A
1.10	Non-standard default packet sizes (16, 32, 64, 256, 512, 1024, 2048, 4096)	C1
1.11	Non-standard default window sizes	A (Note 1)
1.12	Default throughput classes assignment	A
1.13	Flow control parameter negotiation	E
1.14	Basic throughput class negotiation	E
1.15	Extended throughput class negotiation	A
1.16	Closed user group	E
1.17	Closed user group with outgoing access	A
1.18	Closed user group with incoming access	A
1.19	Incoming calls barred within a closed user group	A
1.20	Outgoing calls barred within a closed user group	A
1.21	Bilateral closed user group	A
1.22	Bilateral closed user group with outgoing access	A
1.23	Fast select acceptance	E
1.24	Reverse charging acceptance	A
1.25	Local charging prevention	A
1.26	NUI subscription	A
1.27	NUI override	A
1.28	Charging information	A
1.29	ROA subscription	A
1.30	Hunt group	A
1.31	Call redirection	A
1.32	Call deflection subscription	A
1.33	TOA/NPI address subscription	A, E, (Note 2)
1.34	Direct call	FS
1.35	Internetwork call redirection/deflection prevention subscription	A
1.36	Global alternative address registration	A
1.37	Interface specific alternative address registration	C2
1.38	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

TABLE 7/X.2 (*concluded*)

Facilities of packets switched data transmission service for customized DTE service

Optional user facility		User classes of service 8-12, 26 (synchronous mode) and 30
2.6	Bilateral closed user group selection	C5
2.7	Reverse charging	A
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:

$$R * D/8 \leq k * N1 \tag{1}$$

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

NOTES

1   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 are for further study.

2   See Note 3 to Table 3.

3.4 Additional capabilities provided by multicast service

Additional capabilities provided by multicast services are defined in Recommendation X.6, X.48 and X.49. Optional user facilities are mainly the same as in Table 3. Some facilities may have another role (see Table 8).

TABLE 8/X.2

X.25 optional user facilities which have a different role in multicast service

Facility	Role in multicast service
D-bit modification	Not allowed
Non-standard default packet sizes	Must be the same for all participants in a multicast call
Default throughput class negotiation	For further study
Flow control parameter negotiation	For further study
Throughput class negotiation	For further study
Closed User Group (CUG) related facilities	For further study
Bilateral CUG facilities	For further study
Fast select	For further study
Reverse charging	For further study
Local charging prevention	For further study
Network User Identification (NUI) facilities	For further study
Charging information	For further study
ROA related facilities	For further study
Call redirection and Call deflection facilities	Not allowed
Called line address modification notification	Does not apply
Transit delay selection and indication	For further study

4 Frame relay data transmission service

4.1 Direct access to a frame relay data transmission service

Tables 9 and 10 indicate the services and the optional user facilities, respectively, which should be made available on an international basis in the frame relay data transmission service, and those which may be available on certain data networks and may also be available internationally in case of a direct access to a frame relay data transmission service.

TABLE 9/X.2

Services in frame relay data transmission service (direct access)

Type of service	User classes of service 30-33, 35, 37, 45, 53, 59, 60	User classes of service 34, 36, 38-44, 46-52, 54-58, 61
Switched Virtual Circuit (SVC) service	A	A
Permanent Virtual Circuit (PVC) service	E	A

TABLE 10/X.2

Facilities of frame relay data transmission service (direct acces)

Optional user facility		User classes of service 30-61	
		SVC	PVC
1	*Optional user facilities assigned for a contractual period*		
1.1	Committed burst size	E	E
1.2	Excess burst size	E	E
1.3	Committed information rate	E	E
1.4	Extended address field	A	A
1.5	Incoming calls barred	FS	–
1.6	Outgoing calls barred	FS	–
1.7	Closed user group		
1.7.1	Simple closed user group subscription	E	–
1.7.2	Simple closed user group with outgoing access	A	–
1.7.3	Simple closed user group with incoming access	A	–
1.7.4	Closed user group selection subscription	E	–
1.7.5	Closed user group selection with outgoing access subscription	A	–
1.7.6	Closed user group selection with incoming access subscription	A	–
1.8	Reverse charging prevention	A	–
1.9	Charging information	FS	–
1.10	Call redirection	FS	–
1.11	Direct call	FS	–
1.12	Internetwork call redirection/deflection prevention	FS	–
2	*Optional user facilities on per-call basis*		
2.1	Maximum frame relay information field negotiation	E	–
2.2	Committed burst size negotiation	E	–
2.3	Excess burst size negotiation	E	–
2.4	Committed information rate negotiation	E	–
2.5	Closed user group selection	E	–
2.6	Closed user group with outgoing access selection	A	–
2.7	Reverse charging	A	–
2.8	Charging information	FS	–
2.9	Call redirection or call deflection notification	FS	–
2.10	Transit network selection	A	–
SVC	Applicable when the switched virtual circuits are being used		
PVC	Applicable when the permanent virtual circuits are being used		

4.2 Port access to a frame relay data transmission service

For further study.

5 Leased circuit data transmission service

Table 11 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 11/X.2

Facilities of leased circuit data transmission service

Optional user facility		User classes of service	
		1-2, 14-18	3-7, 19, 31-33, 35, 37, 45, 53, 59
1	Point to point	E	E
2	Multipoint		
2.1	Centralized multipoint	A	A
2.2	Decentralized multipoint	A	A
2.3	Broadcasting multipoint	A	A

Appendix I

Coding of optional user facilities

(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					Sélection rapide et/ou taxation à l'arrivée et/ou option Fast select and/or reverse charging and/or internetwork call redirection/deflection status selection
					X	Fast select and/or reverse charging indication

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 1 0	X					Basic throughput class negotiation
			X			Default throughput classes assignment (basic format)
					X	Basic throughput class indication
0 0 0 0 0 0 1 1	X					Closed user group selection (basic format)
					X	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		Diagnostic element
					X	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 à 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					Bilateral closed user group selection
					X	Transit network identification
0 1 0 0 0 0 1 0	X					Flow control parameter negotiation (packet size)
			X			Non-standard default packet sizes
					X	Packet size indication
0 1 0 0 0 0 1 1	X					Flow control parameter negotiation (window size)
			X			Non-standard default window sizes
					X	Window size indication
0 1 0 0 0 1 0 0	X					ROA selection (basic format)
					X	ROA 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)

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

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 B						
0 1 0 0 1 0 0 1	X					Transit delay selection and indication
					X	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					Extended throughput class negotiation
			X			Default throughput classes assignment (extended format)
					X	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 (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					Call redirection or call deflection notification
					X	Closed user group indication
1 1 0 0 0 1 0 0	X					ROA selection (extended format)
1 1 0 0 0 1 0 1	X					Charging information (monetary unit)
1 1 0 0 0 1 1 0	X					NUI selection
					X	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

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

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 D						
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					Call deflection selection
					X	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	X				X	Super-extended window size (modulo 32768)
1 1 0 1 0 1 1 0 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 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/CEI 8208.						

Appendix II

Relationship of ISDN (I.250-Series Recommendations) Supplementary Services and X.2 Optional User Facilities

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

II.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 Recommendation 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 II.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.

II.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 kinds of ISDN Supplementary Services.

II.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.

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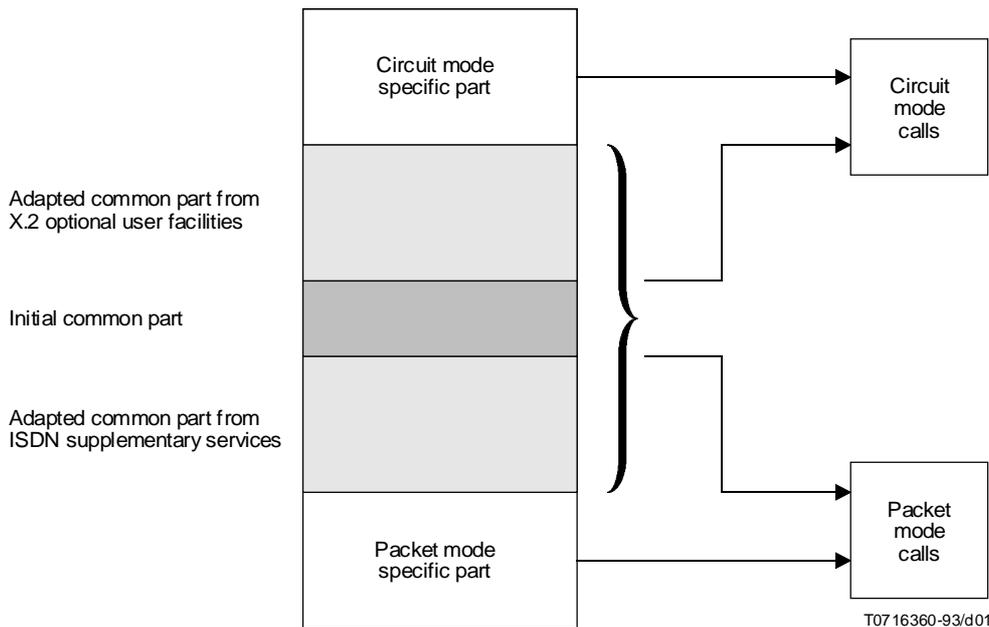
A first attempt to apply this algorithm for alignment is given in Table II.1.

TABLE II.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 Subscriber	–	
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

TABLE II.1/X.2 (*concluded*)

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
Calling Line Identification Presentation	–	Default in Rec. X.25
Calling Line Indentification Restriction	–	May be useful in Rec. X.25
Connected Line Identification Presentation	–	Default in Rec. X.25
Connected Line Identification Restriction	–	May be useful in Rec. X.25
Call Deflection	Call Deflection	
Call Waiting	–	
Direct-Dialling-In	–	Default in Rec. 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 • Service 2: during set-up phase of call, independently of call control messages • Service 3: during the active phase of a call	Fast Select • during set-up and clearing phases of virtual calls • Fast Select with restricted response • By using Q-bit in data packet	
Reverse Charging	Reverse Charging	
–	Incoming Calls Barred	May be useful for non-data calls
–	Outgoing Calls Barred	May be useful for non-data calls
Sub-addressing	Address Extension Facility	
–	Local Charging Prevention	May be useful for non-data calls
–	Recognized Operating Agencies (ROA) related facilities	May be useful for non-data calls
–	Called Line Address Modified Notification	May be useful for non-data calls
–	Transit delay selection and indication	May be useful for non-data calls
–	Alternative addressing	May be useful for non-data calls
–	Internetwork call redirection Prevention Control	May be useful for non-data calls

II.5   Summary

Table II.2 summarizes all the situations.

TABLE II.2/X.2

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

Configuration	ISDN bearer service	ISDN Connection type	Applicability of:			Relationship of: ISDN SS and X.2		
			ISDN SS		X.2 OUF	Independent	Minimum	Maximum
			With signalling	Without signalling				
1) Two ISDN non-data terminals	CMBS	On-demand B-channel Semi-permanent B-channel	Yes No	Yes No	No No	– –	– 	– –
2) Two ISDN data terminals	CMBS	On-demand B-channel Semi-permanent B-channel	Yes No	Yes No	No No	– –	– –	– –
3) X.25 DTE accessing PSPDN through ISDN (Rec. X.31 Case A)	CMBS	On-demand B-channel Semi-permanent B-channel	Yes No	Yes No	Yes Yes	X –	– X	– –
4) X.25 DTE accessing ISDN packet switched data transmission service (Rec. X.31 Case B)	PMBS	On-demand B-channel Semi-permanent B-channel (On-demand) D-channel	No No No	Yes No Yes	Yes Yes Yes	X (Note) – X (Note)	X X X	– – –
5) Integrated ISDN voice/data terminal accessing circuit/packet mode (Rec. 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	No No Yes Yes Yes	– – X (Note) – X (note)	– – – – –	– – X X X

–	Not applicable	OUF	Optional User Facility
X	Applicable	CMBS	Circuit Mode Bearer Services
SS	Supplementary Service	PMBS	Packet Mode Bearer Services

NOTE – The independent case is valid for the case when ISDN Supplementary Services for addressing purposes are used.

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