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TELEMATIC SERVICES

**TERMINAL EQUIPMENTS AND PROTOCOLS
FOR TELEMATIC SERVICES**

**SYNTAX-BASED VIDEOTEX END-TO-END
PROTOCOLS FOR THE PACKET
MODE ISDN**

ITU-T Recommendation T.103

(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 T.103 was prepared by the ITU-T Study Group VIII (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 Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.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.

CONTENTS

	<i>Page</i>
1 Scope	1
2 Normative references	1
3 Definitions and abbreviations	2
3.1 Definitions	2
3.2 Abbreviations	3
4 Introduction	3
4.1 General	3
4.1.1 X.31 Case A access	4
4.1.2 X.31 Case B, B-channel access	4
4.1.3 X.31 Case B, D-channel access	4
4.2 Reference Configurations	4
4.2.1 Using access to PSPDN services (X.31 Case A)	4
4.2.2 Using the ISDN virtual circuit service (X.31 Case B) through the B-channel or the D-channel	4
4.3 Protocol Pillars	4
4.3.1 Using access to PSPDN services (X.31 Case A)	4
4.3.2 Using the ISDN virtual circuit service (X.31 Case B) through the B-channel	8
4.3.3 Using the ISDN virtual circuit service (X.31 Case B) through the D-channel	9
5 Layer 1	9
5.1 Basic access	9
5.2 Primary rate access	10
6 Access to PSPDN services (X.31 Case A)	10
6.1 Co-ordination between B-channel and D-channel	10
6.1.1 General	10
6.1.2 Outgoing calls	10
6.1.3 Incoming calls	10
6.1.4 Clearing virtual circuits	11
6.1.5 Error handling	11
6.2 Layer 2 protocols	11
6.2.1 Layer 2 protocol for the D-channel	11
6.2.2 Layer 2 protocol for the B-channel	11
6.2.2.1 Application rules	11
6.2.2.2 Implementation recommendations	11
6.3 Layer 3 protocols	11
6.3.1 Layer 3 protocol for the D-channel	11
6.3.1.1 The access protocol	11
6.3.1.2 Terminal addresses	11
6.3.1.3 Outgoing calls	13
6.3.1.4 Incoming Calls	14
6.3.1.5 Release of the switched connection	15
6.3.1.6 Supplementary services	15
6.3.2 Layer 3 protocol for the B-channel	15
6.3.2.1 Bearer Independent Service	16
6.3.2.2 Operation over multiple B-channels	16
6.3.2.3 DTE role	16
6.3.2.4 Logical channels to be used	16
6.3.2.5 Packet sizes	16
6.3.2.6 Default packet level window size	16
6.3.2.7 Default throughput class	16

	6.3.2.8	D-bit	16
	6.3.2.9	Q-bit	16
	6.3.2.10	Protocol identifier	17
	6.3.2.11	Address fields.....	17
	6.3.2.12	Data Link Disconnection Request.....	17
	6.3.2.13	Optional user facilities that shall be supported	17
	6.3.2.14	Recommended optional user facilities and CCITT specified DTE facilities ..	18
	6.3.2.15	Excluded Optional user facilities	18
7		Access to the ISDN virtual circuit service (X.31 Case B) through the B-channel.....	19
	7.1	Coordination between B-channel and D-channel	19
	7.1.1	General.....	19
	7.1.2	Outgoing calls	19
	7.1.3	Incoming calls.....	19
	7.1.4	Clearing virtual circuits.....	20
	7.1.5	Error handling	20
	7.2	Layer 2 protocols	20
	7.2.1	Layer 2 protocol for the D-channel	20
	7.2.2	Layer 2 protocol for the B-channel	20
	7.2.2.1	Application rules.....	20
	7.2.2.2	Implementation recommendations	20
	7.3	Layer 3 protocols	20
	7.3.1	Layer 3 protocol for the D-channel	20
	7.3.1.1	The access protocol.....	20
	7.3.1.2	Terminal addresses.....	20
	7.3.1.3	Outgoing calls	21
	7.3.1.4	Incoming calls.....	22
	7.3.1.5	Release of the switched connection	23
	7.3.1.6	Supplementary services.....	23
	7.3.2	Layer 3 protocol for the B-channel	23
	7.3.2.1	Bearer Independent Service	23
	7.3.2.2	Operation over multiple B-channels	24
	7.3.2.3	DTE role	24
	7.3.2.4	Logical channels to be used	24
	7.3.2.5	Packet sizes	24
	7.3.2.6	Default packet level window size	24
	7.3.2.7	Default throughput class	24
	7.3.2.8	D-bit.....	24
	7.3.2.9	Q-bit.....	24
	7.3.2.10	Protocol identifier	24
	7.3.2.11	Address fields.....	25
	7.3.2.12	Data Link Disconnection Request.....	25
	7.3.2.13	Optional user facilities that shall be supported	25
	7.3.2.14	Recommended optional user facilities and CCITT specified DTE facilities ..	25
	7.3.2.15	Excluded optional user facilities	26
8		Access to the ISDN virtual circuit service (X.31 Case B) through the D-channel.....	26
	8.1	Layer 2 protocol.....	26
	8.1.1	The base Recommendation	26
	8.1.2	Same Connection Endpoint Suffix (CES).....	27
	8.1.3	Responsibility for Data Link set-up	27

	<i>Page</i>
8.2 Layer 3 protocols	27
8.2.1 General.....	27
8.2.2 Layer 3 ISDN signalling protocols	27
8.2.2.1 The base Recommendation	27
8.2.2.2 Terminal addresses.....	27
8.2.2.3 Outgoing calls	27
8.2.2.4 Incoming calls.....	27
8.2.2.5 Release of the call	29
8.2.2.6 Supplementary services.....	29
8.2.3 Layer 3 data communication protocol.....	29
8.2.3.1 Bearer Independent Service	29
8.2.3.2 Operation over p-Data Link Connections	29
8.2.3.3 DTE role	29
8.2.3.4 Logical channels to be used	29
8.2.3.5 Packet sizes	29
8.2.3.6 Default packet level window size	29
8.2.3.7 Default throughput class	30
8.2.3.8 D-bit	30
8.2.3.9 Q-bit	30
8.2.3.10 Protocol identifier	30
8.2.3.11 Address fields.....	30
8.2.3.12 Data Link Disconnection Request.....	30
8.2.3.13 Optional user facilities that shall be supported	30
8.2.3.14 Recommended optional user facilities and CCITT specified DTE facilities ..	31
8.2.3.15 Excluded optional user facilities	31
Annex A (informative) – ISDN lower layer communication modes for syntax-based Videotex.....	32
Annex B (informative) – Overview on communication establishment parameters.....	34
B.1 General.....	34
B.2 X.25 packet service access.....	34
B.2.1 X.25 packet service access parameters	34
B.2.2 Access of X.25 packet services over the B-channel (X.31 Case A or Case B).....	35
B.2.3 Access of X.25 packet services over the D-channel (X.31 Case B)	35
B.3 Case selection for communication establishment	36
B.3.1 Outgoing calls	36
B.3.2 Incoming calls.....	37
Annex C (informative) – End-to-end system configurations	39
C.1 Introduction	39
C.2 Network configurations	39
C.3 Types of interfaces at the two end-systems	42
C.4 End-system characteristics.....	42
Annex D (normative) – Additional provisions for Recommendation X.31	43
D.1 General.....	43
D.2 Subclause 2.2/X.31: Configuration for the ISDN virtual circuit service (Case B).....	43
D.3 Subclause 3.2.3.2/X.31: Conditional notification class	44
D.4 Subclause 3.2.3.3/X.31: Unconditional notification class	44
D.5 Subclause 3.2.3.4/X.31: Information mapping from the X.25 incoming call packet to the Q.931 message.....	44
D.6 Subclause 4.1/X.31: Terminal and interface selection.....	44
D.7 Subclause 6.1.1/X.31: Circuit-switched access to PSPDN services (Case A).....	44
D.8 Subclause 6.1.2.1/X.31: B-channel.....	44
D.9 Subclause 6.2.1.2/X.31: Channel selection.....	44
D.10 Subclause 6.2.2.1/X.31: B-channel.....	45

D.11	Subclause 6.2.2.3.1/X.31: Channel selection through call offering.....	45
D.12	Subclause 6.2.2.3.2/X.31: Information element mapping.....	45
D.13	Subclause 6.4.1/X.31: B-channel.....	45
D.14	Subclause 7.3.2/X.31: Rate adaption.....	45
Annex E	(normative) – Additional provisions for Recommendation Q.931	46
E.1	General.....	46
E.2	Subclause 2.1.2/Q.931: Network call states	46
E.3	Subclause 3.1/Q.931: Messages for circuit mode connection control	46
E.4	Subclause 3.1.4/Q.931: CONNECT	46
E.5	Subclause 3.1.8/Q.931: Information	47
E.6	Subclause 3.1.16/Q.931: Setup.....	47
E.7	Subclause 3.2/Q.931: Messages for packet-mode access connection control	47
E.8	Subclause 3.4/Q.931: Messages used with the global call reference	48
E.9	Subclause 4.3/Q.931: Call reference.....	48
E.10	Subclause 4.4/Q.931: Message type	48
E.11	Subclause 4.5/Q.931: Other information elements	48
E.12	Subclause 4.5.1/Q.931: Coding rules	48
E.13	Subclause 4.5.2/Q.931: Extension codesets.....	49
E.14	Subclause 4.5.5/Q.931: Bearer capability.....	49
E.15	Subclause 4.5.6/Q.931: Call identity	49
E.16	Subclause 4.5.7/Q.931: Call state	49
E.17	Subclause 4.5.8/Q.931: Called party number	49
E.18	Subclause 4.5.9/Q.931: Called party sub-address.....	49
E.19	Subclause 4.5.10/Q.931: Calling party number	49
E.20	Subclause 4.5.11/Q.931: Calling party sub-address	49
E.21	Subclause 4.5.13/Q.931: Channel identification.....	50
E.22	Subclause 4.5.15/Q.931: Display.....	50
E.23	Subclause 4.5.16/Q.931: High layer compatibility	50
E.24	Subclause 4.5.18/Q.931: Low layer compatibility.....	51
E.25	Subclause 4.5.21/Q.931: Notification indicator.....	51
E.26	Subclause 4.5.23/Q.931: Repeat indicator	51
E.27	Subclause 4.5.24/Q.931: Restart indicator.....	51
E.28	Subclause 4.7.6/Q.931: Redirecting number	51
E.29	Subclause 5.1.1/Q.931: Call request.....	52
E.30	Subclause 5.1.2/Q.931: B-channel selection – Originating	52
E.31	Subclause 5.1.8/Q.931: Call connected	52
E.32	Subclause 5.2/Q.931: Call establishment at the destination interface	52
E.33	Subclause 5.2.1/Q.931: Incoming call	52
E.34	Subclause 5.2.3.1/Q.931: SETUP message delivered by point-to-point data link.....	52
E.35	Subclause 5.2.6/Q.931: Notification of interworking at the terminating interface.....	52
E.36	Subclause 5.2.4/Q.931: Overlap receiving	52
E.37	Subclause 5.2.7/Q.931: Call accept	53
E.38	Subclause 5.3.3/Q.931: Clearing initiated by the user.....	53
E.39	Subclause 5.3.4.3/Q.931: Completion of clearing	53
E.40	Subclause 5.3.5/Q.931: Clear collision.....	53
E.41	Subclause 5.5/Q.931: Restart procedure.....	53
E.42	Subclause 5.5.1/Q.931: Sending RESTART	53
E.43	Subclause 5.5.2/Q.931: Receipt of RESTART	53
E.44	Subclause 5.6/Q.931: Call rearrangements.....	54
E.45	Subclauses 5.6.1/Q.931 and 5.6.2/Q.931: Call suspension/suspended	54
E.46	Subclause 5.6.3/Q.931: Call suspend error.....	54

	<i>Page</i>
E.47 Subclause 5.6.4/Q.931: Call re-establishment	54
E.48 Subclause 5.6.5/Q.931: Call resume errors.....	54
E.49 Subclause 5.8.3.1/Q.931: Invalid call reference format.....	54
E.50 Subclause 5.8.3.2/Q.931: Call reference procedural errors	54
E.51 Subclause 5.8.5/Q.931: General information element errors.....	54
E.52 Subclause 5.8.7.2/Q.931: Non-mandatory information element content error	54
E.53 Subclause 5.8.9/Q.931: Data link failure	55
E.54 Subclause 5.8.10/Q.931: Status enquiry procedure	55
E.55 Annex B/Q.931: Compatibility checking	55
Annex F (normative) – Information elements for the control of packet-mode access connections	55
F.1 Protocol discriminator.....	55
F.2 Call reference.....	55
F.3 Message type	56
F.4 Other information elements	56
F.6 Redirecting number	57
Annex G (informative) – References.....	60

SYNTAX-BASED VIDEOTEX END-TO-END PROTOCOLS FOR THE PACKET MODE ISDN

(Helsinki, 1993)

1 Scope

This Recommendation specifies the usage of all protocols and supplementary services up to and including layer 3 for syntax-based Videotex terminal equipment in the ISDN. The scope of this Recommendation is limited to virtual circuits using the three different DTE/DCE modes of connection. i.e.:

- a) the DTE/DCE connection to PSPDN services (X.31 Case A);
- b) the ISDN virtual circuit service through the B-channel (X.31 Case B);
- c) the ISDN virtual circuit service through the D-channel (X.31 Case B).

This Recommendation is applicable to terminal equipment supporting the syntax-based Videotex using either basic access or primary rate access to the ISDN. In this context, a terminal equipment is either a Videotex Terminal, a Videotex Service Centre, a Videotex Access Point or a Videotex Host (see 3. 1).

This Recommendation is based on other CCITT Recommendations or International Standards, and where necessary, it adds new or other requirements as application rules.

2 Normative references

- [1] CCITT Recommendation F.300 (1988), *Videotex Service*.
- [2] CCITT Recommendation I.333 (1988), *Terminal Selection Functions in ISDN*.
- [3] CCITT Recommendation I.430 (1988), *Integrated Services Digital Network (ISDN) – Basic user-network interface, Layer 1 specification*.
- [4] CCITT Recommendation I.431 (1988), *Integrated Services Digital Network (ISDN) – Primary rate user-network interface, Layer 1 specification*.
- [5] CCITT Recommendation T.105 (1993), *Syntax-based Videotex application layer protocol*.
- [6] CCITT Recommendation Q.921 (1988), *Integrated Services Digital Network (ISDN) – User-network interface data link layer specification*.
- [7] CCITT Recommendation 0.931 (1988), *Integrated Services Digital Network (ISDN) – User-network interface layer 3, Specification for basic call control*.
- [8] CCITT Recommendation X.25 (1988), *Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and connected to public data network by dedicated circuit*.
- [9] CCITT Recommendation X.31 (1988), *Support of packet mode terminal equipment by an ISDN*.
- [10] CCITT Recommendation X.32 (1988), *Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and accessing a packet switched public data network through a public switched telephone network or an integrated services digital network or a circuit switched public data network*.
- [11] ISO 7498:1984, *Information processing systems – Open Systems Interconnection – Basic Reference Model*.
- [12] ISO 7776:1986, *Information processing systems – Data communications – High-level data link control procedures – Description of the X.25 LAPB-compatible DTE data link procedures*.

- [13] ISO/IEC 8208:1990, *Information technology – Data communications – X.25 Packet Layer Protocol for Data Terminal equipment*.
- [14] ISO 8509:1987, *Information processing systems – Open Systems interconnection – Service Conventions*.
- [15] ISO/IEC TR 9577:1990, *Information technology – Telecommunications and information exchange between systems – Protocol identification in the network layer*.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this Recommendation, the following definitions apply:

access function: The functional entity which gives access to the Videotex Service. This entity is an integral part of the Videotex Service.

access network: The network which provides the link between the Terminal Function and the Access Function.

bearer independent service access point: Point in an end system where the user of the Bearer Independent Service accesses the service.

called BIS user: A BIS user with whom a calling BIS user wishes to establish a Network Connection.

calling BIS user: A BIS user that initiates a Network Connection establishment request.

data circuit-terminating-equipment: See ISO/IEC8208 [13] and CCITT Recommendation X.25 [8].

data terminal equipment: See ISO/IEC 8208 [13] and CCITT Recommendation X.25 [8].

host function: The abstraction of the Videotex Applications available in a particular Videotex Service.

logical channel: See ISO/IEC 8208 [13] and CCITT Recommendation X.25 [8].

network connection: See OSI Reference Model ISO 7498 [11].

network layer: See OSI Reference Model ISO 7498 [11].

network service: See OSI Reference Model ISO 7498 [11].

packet layer: See ISO/IEC 8208 [13] and CCITT Recommendation X.25 [8].

primitive: See Service Conventions Standard ISO/TR 8509 [14].

terminal function: The abstraction of a functional entity which acts as a Videotex Terminal.

videotex access point: See CCITT Recommendation F.300 [1].

videotex host: This term describes a computer which offers one or more applications and/or facilities. It can be represented through a Videotex Host Computer, an External Videotex Host or a Videotex Service Centre.

videotex host computer: See CCITT Recommendation F.300 [1].

videotex service: See CCITT Recommendation F.300 [1].

videotex service centre: See CCITT Recommendation F.300 [1].

NOTE – According to CCITT Recommendation F.300, a Videotex Service Centre provides host and/or access functions, i.e. it may also act as a Videotex Access Point.

videotex terminal: See CCITT Recommendation F.300 [1].

virtual call: See ISO/IEC 8208 [13] and CCITT Recommendation X.25 [8].

virtual circuit: See ISO/IEC 8208 [13] and CCITT Recommendation X.25 [8].

3.2 Abbreviations

For the purposes of this Recommendation, the following abbreviations apply:

AU	Access Unit
BC	Bearer Capability
BIS	Bearer Independent Service
CCITT	International Telegraph and Telephone Consultative Committee
CES	Connection Endpoint Suffix
D-bit	Delivery Confirmation bit
DCE	Data Circuit-terminating Equipment
DDI	Direct-Dialling-In
DTE	Data Terminal Equipment
DXE	either a DTE or a DCE
ETS	European Telecommunication Standard
HLC	High Layer Compatibility
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
LLC	Low Layer Compatibility
M-bit	More Data bit
MSN	Multiple Subscriber Number
NL	Network Layer
NS	Network Service
OSI	Open Systems Interconnection
PABX	Private Automatic Branch eXchange
PDN	Public Data Network
PH	Packet Handler
PLP	Packet Level Protocol
PSPDN	Packet Switched PDN
PSTN	Public Switched Telephone Network
PVC	Permanent Virtual Circuit
Q-bit	Qualifier bit
SBV	Syntax-Based Videotex
SUB	Sub-addressing
TP	Terminal Portability
UUS	User-to-User Signalling
VC	Virtual Call

4 Introduction

4.1 General

The following subclauses specify the additional requirements to those as specified in Recommendation T. 105 [5] to provide the Bearer Independent Service for syntax-based Videotex (SBV BIS)

ISDN end-systems conforming to this Recommendation present protocol stacks at the S- or T-reference point as indicated in 4.3. Only virtual circuit services are within the scope of this Recommendation.

For outgoing calls, the requirements of 6.1/X.31 [9] shall apply.

For incoming calls, the requirements of 6.2/X.31 [9] shall apply

The following subclauses consider the different cases of X.25 packet service access types (i.e. X.31 [9] case A, X.31 [9] case B, B-channel or D-channel).

NOTES

- 1 Annex A (informative) gives an overview of all the different possible communication modes in an ISDN.
- 2 Annex B (informative) summarises possibilities for accessing the X.25 [8] packet services at the S/T reference point and gives the different parameters for case selection.
- 3 This Recommendation makes reference to Recommendations X.31 [9] and Q.931 [7]. Additional provisions in the context of this Recommendation are given in normative Annexes D and E, respectively.
- 4 In the following subclauses, the term “Semi-permanent” refers to both of the two access types as defined in clause 6/X.31 [9].

4.1.1 X.31 Case A access

For the X.31 Case A “Switched” access of the B-channel, the requirements of clauses 5 (Layer 1) and 6 shall apply.

For the X.31 Case A “Semi-permanent access of the B-channel, the requirements of clause 5 (Layer 1) and of 6.1.5 (error handling), 6.2.2 (Layer 2 of the B-channel) and 6.3.2 (Layer 3 of the B-channel) shall apply.

4.1.2 X.31 Case B, B-channel access

For the X.31 Case B “Switched” access of the B-channel, the requirements of clauses 5 (Layer 1) and 7 shall apply.

For the X-31 Case B “Semi-permanent” access of the B-channel, the requirements of clause 5 (Layer 1) and of 7.1.5 (error handling), 7.2.2 (Layer 2 of the B-channel) and 7.3.2 (Layer 3 of the B-channel) shall apply.

4.1.3 X.31 Case B, D-channel access

The requirements of clauses 5 (Layer 1) and 8 shall apply, except that 8.2.2.4 (incoming calls) shall not be applicable if the “No notification” class is used.

4.2 Reference Configurations

This subclause illustrates the different scenarios as covered by this Recommendation. For a clarification of the resulting possible end-to-end configurations refer to Annex C (informative).

4.2.1 Using access to PSPDN services (X.31 Case A)

Figure 1 illustrates the scenario for the access via an access unit (AU) to a PSPDN which is conceptually not a part of the ISDN. For a detailed description refer to 2.1/X.31 [9], “Configuration when accessing PSPDN services”.

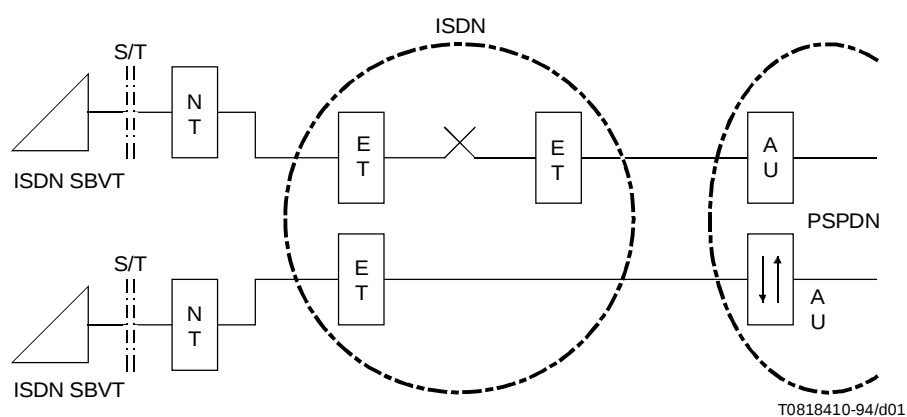
4.2.2 Using the ISDN virtual circuit service (X.31 Case B) through the B-channel or the D-channel

Figure 2 shows the scenario for the case that a packet handler (PH) is an integral part of the ISDN. For a detailed description refer to 2.2/X.31 [9], “Configuration for the ISDN virtual circuit service”.

4.3 Protocol Pillars

4.3.1 Using access to PSPDN services (X.31 Case A)

The protocol pillar in Figure 3 is applicable for the access to PSPDN services:



— B-channel is used
 S/T Coincident S- and T-reference point
 NT Network termination
 ET Exchange termination
 AU ISDN access unit ports
 SBVT Syntax-based Videotex terminal

NOTE – This figure is only an example of many possible configurations and is included as an aid to the text describing the various interface configuration.

FIGURE 1/T.103
Configuration based on X.31 [9], Case A

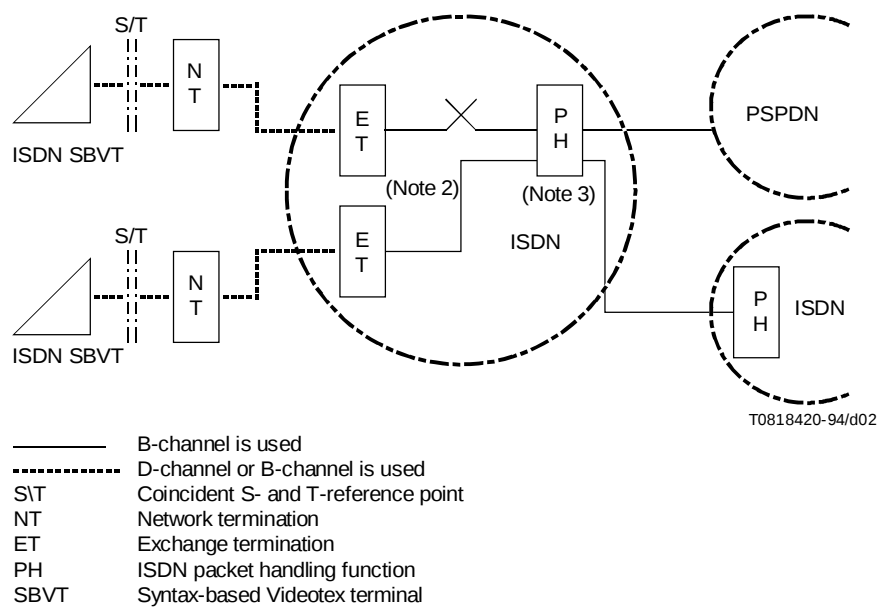


FIGURE 2/T.103
Configuration based on X.31 [9], Case B

3	Coordination (Note 1)	
	BIS (Note 2)	
	Q.931 [7]	ISO/IEC 8208 [13] (X.25 PLP for DTE/DCE) (Note 3)
2	Q.921 [6]	ISO 7776 [12] (X.25 LAPB for DTE/DCE) (Note 4)
1	I.431 [4] or I.430 [3]	
Layer	D-channel	B-channel

NOTES

1 The coordination function specifies the relationship between D-channel and B-channel protocol pillars and is consistent with Recommendation X.31 [9].

2 The syntax-based Videotex Bearer Independent Service (SBV BIS) is defined in clause 11/T.105 [5]. It covers also some aspects of the out-band signalling procedures.

3 CCITT Rec. X.25 [8] PLP may also be taken as the base Recommendation. However, only ISO/IEC 8208 [13] is referred to explicitly throughout this Recommendation.

4 CCITT Rec. X.25 [8] LAPB may also be taken as the base Recommendation. However, only ISO 7776 [12] is referred to explicitly throughout this Recommendation.

FIGURE 3/T.103

Protocol pillar for the DTE/DCE connection to PSPDN services (X.31 [9] Case A)

At layer 1, Recommendation I.430 [3] is used for ISDN basic access and Recommendation I.431 [4] is used for ISDN primary rate access. At layer 2, CCITT Rec. Q.921 [6] provides for the LAPD Data link procedures on the D-channel and ISO 7776 [12] provides for the LAPB Data link procedures on the B-channel (additional application rules are given in 6.2) At layer 3, CCITT Rec. Q.931 [7] signalling procedures are used on the D-channel, and ISO/IEC 8208 [13] packet level protocol is used in DTE/DCE operation on the B-channel (additional application rules are given in 6.3).

The provisions of the SBV BIS as defined in clause 11/CCITT Rec. T.105 [5] apply with regard to the mappings of the BIS primitives and parameters to and from the elements of the ISO/IEC 8208 [13] packet level protocol.

4.3.2 Using the ISDN virtual circuit service (X.31 Case B) through the B-channel

The protocol pillar in Figure 4 is applicable for an access using ISDN virtual circuit services over the B-channel.

3	Coordination (Note 1)	
	BIS (Note 2)	
	Q.931 [7]	ISO/IEC 8208 [13] (X.25 PLP for DTE/DCE) (Note 3)
2	Q.921 [6]	ISO 7776 [12] (X.25 LAPB for DTE/DCE) (Note 4)
1	I.431 [4] or I.430 [3]	
Layer	D-channel	B-channel

NOTES

1 The coordination function specifies the relationship between D-channel and B-channel protocol pillars and is consistent with Recommendation X.31 [9].

2 The syntax-based Videotex Bearer Independent Service (SBV BIS) is defined in clause 11 of Recommendation T.105 [5]. It covers also some aspects of the out-band signalling procedures.

3 CCITT Rec. X.25 [8] PLP may also be taken as the base Recommendation. However, only ISO/IEC 8208 [13] is referred to explicitly throughout this Recommendation.

4 CCITT Rec. X.25 [8] LAPB may also be taken as the base Recommendation. However, only ISO 7776 [12] is referred to explicitly throughout this Recommendation.

FIGURE 4/T.103

Protocol pillar for the DTE/DCE connection using the ISDN virtual circuit service through the B-channel (X.31 [9] Case B)

At layer 1, Recommendation I.430 [3] is used for ISDN basic access and Recommendation I.431 [4] is used for ISDN primary rate access. At layer 2, CCITT Rec. Q.921 [6] provides for the LAPD Data link procedures on the D-channel and ISO 7776 [12] provides for the LAPB Data link procedures on the B-channel (additional application rules are given in 7.2). At layer 3, CCITT Rec. Q.931 [7] signalling procedures are used on the D-channel, and ISO/IEC 8208 [13] packet level protocol is used in DTE/DCE operation on the B-channel (additional application rules are given in 7.3).

The provisions of the SBV BIS as defined in clause 11/CCITT Rec. T.105 [5] apply with regard to the mappings of the BIS primitives and parameters to and from the elements of the ISO/IEC 8208 [13] packet level protocol.

4.3.3 Using the ISDN virtual circuit service (X.31 Case B) through the D-channel

The protocol pillar in Figure 5 is applicable for an access using ISDN virtual circuit services over the D-channel.

3	Coordination (Note 1)	
	BIS (Note 2)	
	Q.931 [7] (Note 3)	ISO/IEC 8208 [13] (X.25 PLP for DTE/DCE) (Note 4)
2	Q.921 [6]	
1	I.431 [4] or I.430 [3]	

Layer D-channel

NOTES

- 1 The coordination function specifies the relationship between the two layer 3 protocol pillars and is consistent with Recommendation X.31 [9].
- 2 The syntax-based Videotex Bearer Independent Service (SBV BIS) is defined in clause 11/T.105 [5]. It covers also some aspects of the out-band signalling procedures.
- 3 Recommendation Q.931 [7] is applicable for incoming calls.
- 4 CCITT Rec. X.25 [8] PLP may also be taken as the base Recommendation. However, only ISO/IEC 8208 [13] is referred to explicitly throughout this Recommendation.

FIGURE 5/T.103

Protocol pillar for the DTE/DCE connection using the ISDN virtual circuit service through the D-channel (X.31 [9] Case B)

At layer 1, Recommendation I.430 [3] is used for ISDN basic access and Recommendation I.431 [4] is used for ISDN primary rate access. At layer 2, Rec. Q 921 [6] provides for the LAPD Data link procedures on the D-channel (additional application rules are given in 8.1). At layer 3, ISO/IEC 8208 [13] packet level protocol is used in DTE/DCE operation (additional application rules are given in 8.2.3). In addition, CCITT Rec. Q.931 [7] is used for the notification of incoming calls (additional application rules are given in 8.2.2).

The provisions of the SBV BIS as defined in clause 11/CCITT Rec. T.105 [5] apply with regard to the mappings of the BIS primitives and parameters to and from the elements of the ISO/IEC 8208 [13] packet level protocol.

5 Layer 1

5.1 Basic access

For terminals using the basic access to an ISDN, Recommendation I.430 [3] is applicable without any additional rule

5.2 Primary rate access

For terminals using the primary rate access to an ISDN, Recommendation I.431 [4] is applicable without any additional rule.

6 Access to PSPDN services (X.31 Case A)

6.1 Co-ordination between B-channel and D-channel

6.1.1 General

ISDN Videotex end-systems supporting access to PSPDN services over the B-channel (X.31 [9] Case A) shall use a protocol stack at the S- or T- reference point in accordance with the standards as indicated in Figure 3 (see 4.3.1).

One stack is used to support signalling on the D-channel for circuit switched access to the access unit function (AU) of the PSPDN. In the case of the semi-permanent B-channel service, this stack is null. The other stack is used to support packet switched signalling and information transfer. The detailed protocols are given in 6.2.2 and 6.3.2.

Clause 11/CCITT Rec. T.105 [5] provides the definition of a Bearer Independent Service for syntax-based Videotex (SBV BIS) and the mapping of its elements to the protocol and procedures of ISO/IEC 8208 [13]. Additional requirements for calls originated by or directed toward the ISDN end-system are specified below. Co-ordination is only required for switched B-channel ISDN connections between the end-system and the AU.

6.1.2 Outgoing calls

Additional procedures are required if a B-channel is not already established or if an additional B-channel is needed to support the additional traffic.

The reception by layer 3 of a BIS-N-CONNECT request primitive shall first cause the ISDN D-channel signalling procedure for demand access to be used to establish a B-channel as indicated in 6.3.

NOTE 1 The “Called party number” information element of the SETUP message as defined in Recommendation Q.931 [7] contains the ISDN address of the PSPDN Access Unit. The determination of the contents of this information element, and its derivation from the “Called Address” parameter of the BIS-N-CONNECT primitive are a local matter.

After a successful establishment of this B-channel connection, the procedures of clause 11/T.105 [5] shall apply.

NOTE 2 – The called address in the X.25 CALL REQUEST packet (derived from the BIS-N-CONNECT request primitive) is used for routing from the AU through the Access Network to the Access Function.

Failure to establish the B-channel connection is indicated to the BIS user by means of a BIS-N-DISCONNECT indication primitive with the originator parameter indicating “ISDN” and the reason parameter filled as indicated in 6.1.5.

6.1.3 Incoming calls

For the “No notification” class, no additional procedures are required.

If an ISDN end-system interface has subscribed to the “Conditional notification” class, and the AU needs to establish a B-channel (first B-channel or additional B-channel) for the incoming call packet which it has to send to this ISDN packet mode end-system, the following additional procedures are required.

The attempt to establish a B-channel will cause the ISDN call offering procedures to be used at the ISDN end-system interfaces, as described in 6.3.1.4 and in 6.2.1.2/X.31 [9]. These procedures may offer the called ISDN end-system to determine which idle B-channel is to be used. These procedures are not visible to the BIS user (i.e. no BIS primitive will be issued to this BIS user).

After the successful establishment of this B-channel connection, the procedures specified in 6.2.2 and 6.3.2 and clause 11/T.105 [5] shall apply.

6.1.4 Clearing virtual circuits

It is recommended that the NL entity starts a timer T320 (see Recommendation Q.931 [7]) after the last SBV Network Connection has been released. This timer is cleared upon establishment of the next virtual circuit. Upon expiry of T320, clearing of the B-channel should be initiated.

These procedures are not visible to the BIS user.

6.1.5 Error handling

If one or more SBV Network Connections are established or in the process of being established on an established B-channel and that B-channel is disconnected, this disconnection shall be indicated to the BIS user by means of a BIS-N-DISCONNECT indication primitive with the originator parameter indicating "ISDN".

The reason parameter for each of the SBV Network Connections established or in the process of being established is equal to Recommendation Q.931 [7] cause of the related clearing message. In case of the transmission or the receipt of a RESTART message, the reason parameter indicates "Temporary failure" (cause #41).

6.2 Layer 2 protocols

6.2.1 Layer 2 protocol for the D-channel

The base Recommendation for the layer 2 protocol of the D-channel is Recommendation Q.921 [6]. The provision of Recommendation Q.921 [6] applicable to Data Link Connections between SAPs used for call control procedures (SAPI = 0) are valid without further application rules.

NOTE – The D-channel protocol is only applicable to switched ISDN connections between the terminal and the AU.

6.2.2 Layer 2 protocol for the B-channel

The base Recommendation for the layer 2 protocol of the B-channel is ISO 7776 [12]. The conformance requirements for the Data Link Layer in the B-channel shall be in accordance with the base Recommendation with respect to DTE/DCE operation and with CCITT Rec. X.32 [10], subject to the provisions as detailed in the remainder of this subclause.

NOTE – CCITT Rec. X.25 [8] LAPB may also be taken as base Recommendation, however explicit references to subclauses are only made with respect to ISO 7776 [12] in this Recommendation.

6.2.2.1 Application rules

The application rules of Table I shall apply.

6.2.2.2 Implementation recommendations

The implementation recommendations for layer 2 of the channel are contained in Table 2.

6.3 Layer 3 protocols

6.3.1 Layer 3 protocol for the D-channel

6.3.1.1 The access protocol

The base Recommendation for the layer 3 protocol of the D-channel is Recommendation Q.931 [7]. The requirements of the base Recommendation shall apply, subject to the provisions of Recommendation X.31 [9] (as far as applicable to terminals accessing the PSPDN service), and subject to the provisions of the subsequent subclauses.

NOTE – The D-channel protocol is only applicable to switched ISDN connections between the terminal and the AU.

6.3.1.2 Terminal addresses

Subclause 4.1/X-31 [9] shall apply. For the use of addressing supplementary services, see 6.3.1.6 below.

TABLE 1/T.103

Application rules for B-channel layer 2

Case	Item	Application Rule
a	Single link procedure	Only the single link procedure shall be supported.
b	Independence of LAPB protocols	An independent LAPB protocol shall operate over each B-channel.
c	Data Link set-up	The responsibility for Data Link setup depends on the notification class and on other agreements with the network provider. Table B.1 (informative) shows the different possibilities.
d	Maximum frame length Nl	Parameter Nl (maximum number of bits in an l-frame) shall be such that the Data Link layer is capable of carrying the maximum packet size negotiated at the packet level, plus the related packet level and Data Link level control information. Guidance on the derivation of the value of Nl can be found in Appendix II/X.25 [8].
e	Link set-up in FRMR condition	The DTE shall support the procedure of transmitting an FRMR response frame up to N2 times, if necessary, in order to get the DCE to reset the link.
f	Address assignment	The Data Link Layer address assignment shall be according to one of the methods described in 5.2/X.32 [10].
g	Modes of operation	Basic (module 8) operation shall be supported. Extended mode of operation (module 128) may be supported in addition.
h	Default window size k	The default window sizes shall be: 7 for basic mode of operation; 80 for extended mode of operation.
i	Selection of mode of operation and window size	In case of demand access of the PSPDN: If no negotiation of the mode of operation is performed, the basic mode shall be used. If no negotiation of the window size k is performed, the default window size shall be taken. The use of out-band signalling employing LLC information elements to negotiate the mode of operation and/or window size is for further study. The use of XID procedures to negotiate the mode of operation and/or window size is for further study. In case of semi-permanent access of PSPDN: Operational agreements between the user and the provider of the PSPDN services apply.
j	Disconnection order	In the normal procedure for disconnection, the Data Link shall be disconnected before disconnecting the B-channel.
k	Identification	When an exchange of identification information between DTE and DCE is needed, the method of exchange shall be one of the methods given in X.32 [10]. The requirements of the PSPDN govern which method is used.
NOTES 1 The different draft functional standards specify the use of basic mode. However, extended mode is not ruled out explicitly and is for further study. 2 Recommendation T.90 (1992) specifies procedures for B-channel negotiation of layer 2 parameters using the "Exchange Identification (XID) Frame" mechanism. The use of this is for further study.		

TABLE 2/T.103

Implementation recommendations for B-channel layer 2

Case	Item	Implementation recommendations
a	Address assignment	It is strongly recommended, that both methods of Data Link Layer address assignment, as described in 5.2/X.32 [10], are implemented. Which method is used, depends on the operational requirements of the PSPDN.
b	Parameter N2	For parameter N2 (maximum number of attempts) the value 10 is recommended.
c	Timer T1	It is recommended that the value of Timer T1 (retransmission) is tuneable in the range from 100 ms to 15 s.
d	I-frame acknowledgement	It is recommended that an RR frame be used as an acknowledgement of received I-frames, unless an outgoing I-frame is available.
e	Timer T3	It implemented Timer T3 (disconnected) is recommended to be greater than or equal to $T1 \times 10$.
f	Timer T4	It is recommended to implement Timer T4.

6.3.1.3 Outgoing calls

The requirements of 4.2 and 6.1.1/X.31 [9] apply without modification.

The Bearer Capability information element shall be coded as indicated in Table 3. Fields not shown in the table shall be omitted.

TABLE 3/T.103

Coding of the Bearer Capability information element

Octets	Information element field	Field value
1	Information element identifier	Bearer capability
2	Length of contents of information element	00000010
3	Coding standard	CCITT standardized coding
	Information transfer capability	Unrestricted digital information
4	Transfer mode	Circuit mode
	Information transfer rate	64 kbit/s

The Low Layer Compatibility information element shall be coded as indicated in Table 4. Fields not shown in the table shall be omitted.

The High Layer Compatibility information element shall not be included in the SETUP message.

TABLE 4/T.103

Coding of the Low Layer Compatibility information element

Octets	Information element field	Field value
1	Information element identifier	Low layer compatibility
2	Length of contents of information element	00000101
3	Coding standard	CCITT standardized coding
	Information transfer capability	Unrestricted digital information
4	Transfer mode	Circuit mode
	Information transfer rate	64 kbit/s
5	User information layer 1 protocol	CCITT standardized rate adaption X.31 HDLC flag stuffing (Note)
6	User information layer 2 protocol	Recommendation X.25, link layer
7	User information layer 3 protocol	Recommendation X.25, packet layer
NOTE – Octet 5 is not mandatory in Recommendation T.90. When used, it should be coded like above.		

6.3.1.4 Incoming Calls

To select a called terminal correctly, the terminal(s) at the user/network interface will be served with information generated by the calling terminal and the intermediate network(s).

Annex B/Q.931 [7], specifies the procedure of compatibility checking as part of the access protocol. The information elements to be considered are those containing address information, the Bearer Capability information element and the Low Layer Compatibility information element.

The requirements of Annex B/Q.931 [7] shall apply. The following rules specify further details on terminal selection and compatibility checking and add requirements for Syntax-based Videotex terminals.

The result of this procedure is to decide whether to ignore, to reject or to accept the incoming call.

a) *B.3.1/Q.931 [7]*

It a call is offered with address information, this information shall be checked against the local address before network-to-user and user-to-user compatibility checking. In this context, Note 1 in B.3.1/Q.931 [7] is not applicable.

In case of mismatch of any presented address information, no further compatibility checking is required and the call shall be ignored.

If no address information is offered, or the offered address information is not complete with respect to the local address (e.g. because the Sub-addressing supplementary service is subscribed, but the called sub-address is not offered), the terminal shall continue with network-to-user and user-to-user compatibility checking. It is not allowed to ignore a call for missing address information only.

b) *B.3.2/Q.931 [7]*

A terminal matches the received network-to-user information, if the information in the received Bearer Capability information element offered in the SETUP message is exactly as specified in Table 3 (i.e. fields not indicated in this table shall not be present).

It a mismatch is detected while checking the Bearer Capability information element, the terminal shall reject the call in accordance to 5.2.5.1/Q.931 [7]. It is not permitted to ignore the call.

c) *B.3.3/Q.931 [7]*

All offered user-to-user compatibility information shall be checked.

The user-to-user compatibility information may not be presented in some interworking cases with certain ISDNs and non-ISDNs. Not all of these interworking cases will be indicated by means of a progress indicator information element. Therefore a terminal need not reject an incoming call due to missing user-to-user information elements, independently of the information possibly provided by progress indicators.

If user-to-user compatibility information (contained in the LLC information element) is offered in the SETUP message, a terminal matches this information if this information is as specified in Table 4.

If the user-to-user compatibility information is not offered or not offered completely, a terminal may act as a compatible terminal independently of whether the progress indicator is present or not.

If a mismatch is detected, the terminal shall reject the call in accordance to 5.2.5.1/Q.931 [7]. It is not permitted to ignore the call.

d) *B.3.4/Q.931 [7]*

This subclause requires user actions to be carried out as result of compatibility checking. It is superseded by this Recommendation.

If a terminal has not rejected or ignored the call while following the procedures a), b), c) and d), it shall accept the call or reject it for other reasons (see below).

If a terminal is obliged to reject the call while following the procedures a) to d), the cause code to be used is defined in B.3/Q.931 [7].

If a terminal rejects the call for different reasons, it should indicate a cause from the following list:

- a) cause code # 17: User busy (already involved in another call);
- b) cause code #47: Resources unavailable, unspecified;
- c) cause code #21: Call rejected (e.g., other local reasons apply).

If the terminal accepts the incoming call, the co-ordination function initiates the appropriate Link Layer and Network Layer functions in the channel as detailed in 6. 1.

6.3.1.5 Release of the switched connection

Subclause 6.4.1/X.31 [9] applies, however the terminal shall not release the switched connection while a virtual call is established or in the process of being established over the related B-channel.

NOTE – Further requirements on handling of failures or premature clearing of the switched connection can be found in the description of the co-ordination function in 6.1.

6.3.1.6 Supplementary services

The use of supplementary services of a specific ISDN depends on provisions and requirements of the network.

The procedures for UUS are specified in Recommendation Q.931 [7].

The addressing supplementary services: DDI (Direct-Dialling-In), MSN (Multiple Subscriber Number) or SUB (Sub-addressing), or a combination of them, may be useful or even required by the network, if multiple terminals have been attached to the same ISDN address.

The TP (Terminal Portability) supplementary service shall not be used.

6.3.2 Layer 3 protocol for the B-channel

The base Recommendation for the Network Layer in the B-channel is ISO/IEC 8208 [13]. The conformance requirements for the Network Layer in the channel shall be in accordance with the base Recommendation with respect to DTE/DCE operation and with CCITT Rec. X.32 [10], subject to the additional requirements as detailed in the remainder of this subclause.

NOTE – Rec. X.25 [8] PLP may also be taken as base Recommendation, however explicit references to subclauses are only made with respect to ISO/IEC 8208 [13] in this Recommendation.

6.3.2.1 Bearer Independent Service

The service that the Network Layer entity provides to the Videotex application with respect to setup, clear, reset of Network Connections and data transfer over established Network Connections, shall be as described in clause 11/T.105 [5].

6.3.2.2 Operation over multiple B-channels

If a terminal operates more than one B-channel, the Network Layer of each B-channel connection shall be processed independently from the Network Layer of each other B-channel connection.

6.3.2.3 DTE role

The Network Layer entity shall adopt the role of a DTE.

6.3.2.4 Logical channels to be used

The logical channel ranges (LIC, HIC, LTC, HTC, LOC and HOC) to be used are determined by local knowledge. If local knowledge is not available, then by default only a single two-way logical channel shall be used. (i.e. LTC and HTC will be set to 1, while LIC, HIC, LOC and HOC shall be set to zero). If more than one logical channel is available, a higher value of HTC may be negotiated using the On-line Facility Registration facility.

If a DTE is capable of initiating a REGISTRATION request packet, then the registration parameters shall be set as follows:

- The LIC, HIC, LOC and HOC parameter shall be set to zero. The LTC shall be set to the value of 1. The value in the “total number of logical channels” parameter field shall be set equal to the value in the HTC parameter field.

6.3.2.5 Packet sizes

The Network Layer entity shall be capable of supporting the standard default packet size of 128 octets. The only permitted maximum data packet sizes are 128, 256, 512, 1024 and 2048 octets. Packet sizes other than the standard default packet size may be negotiated on a per call basis using the “Flow Control Parameter Negotiation” facility.

6.3.2.6 Default packet level window size

The Network Layer entity shall be capable of supporting the standard default window size of 2. Other window sizes may be negotiated on a per call basis using the “Flow Control Parameter Negotiation” facility.

6.3.2.7 Default throughput class

The default throughput class assigned to each direction of transmission shall be 64 kbit/s. Other default throughput class values may be agreed on a subscription basis. Other throughput classes may be negotiated on a per call basis using the “Throughput Class Negotiation” facility.

6.3.2.8 D-bit

The D-bit shall always be set to 0.

The Network Layer entity shall either ignore the D-bit in a received data packet, or treat as an error the occurrence of the D-bit set to 1 in a received data packet. If the Network Layer entity chooses to treat it as an error, it shall reset the logical channel indicating the cause “DTE originated” and the diagnostics “D-bit procedure not supported” (value = 166).

6.3.2.9 Q-bit

The Q-bit shall be set to the same value in all data packets of a complete data packet sequence to be transmitted.

The user data of a received complete data packet sequence shall be passed to the higher layers, if the Q-bit setting is the same in all packets of the sequence. Otherwise the Network Layer entity shall reset the logical channel indicating the cause “DTE originated” and the diagnostics “Inconsistent Q-bit settings” (value = 83).

6.3.2.10 Protocol identifier

The protocol identification in the Network Layer is described in the Technical Report ISO/IEC TR 9577 [15]. In ISO/IEC 8208 [13], the first octet of the call user data field within a CALL REQUEST/INCOMING CALL packet contains the “subsequent protocol identifier” (SPI) used to identify the higher layer protocols.

For the application of Videotex the bit pattern of the SPI is:

bit	8	7	6	5	4	3	2	1
	0	0	0	0	0	0	0	1

This bit pattern corresponds to “CCITT X.29” in Table 4/ISO/IEC TR 9577 [15].

In outgoing calls, the call user data field of the CALL REQUEST packet shall contain the above bit pattern as first octet.

In incoming calls, the above bit pattern shall be interpreted by the Network Layer entity that the Videotex application is requested.

The contents of remaining octets (besides the first octet) of the call user data field within an INCOMING CALL packet shall be ignored by the Network Layer entity.

6.3.2.11 Address fields

The CALL REQUEST packet shall contain the called DTE address. The encoding depends on the requirements of the PSPDN (see also 6.1.2). The use of the calling DTE address field is dependent on the requirements of the PSPDN.

6.3.2.12 Data Link Disconnection Request

In the normal procedure for clearing, all calls should be cleared before requesting the disconnection of the Data Link.

6.3.2.13 Optional user facilities that shall be supported

The packet level optional user facilities that shall be supported by the terminal are shown in Table 5.

NOTE – For switched B-channel access, PSPDNs/ISDNs might offer only a restricted set of facilities (default profile). Thus, if a DTE (Videotex terminal) requests a specific facility, this might not be available or even cause the call to be cleared (e.g., flow control parameter negotiation is not allowed by the network).

TABLE 5/T.103

Supported packet level optional user facilities

Facility	ISO/IEC 8208 [13] (Subclauses)
Default Throughput Classes Assignment	13.11
Flow Control Parameter Negotiation	13.12
Throughput Class Negotiation	13.13

6.3.2.14 Recommended optional user facilities and CCITT specified DTE facilities

The packet level optional user facilities and CCITT specified DTE facilities that are shown in Table 6 are those for which implementation is recommended for greater flexibility. The use of the optional user facilities depends on operational requirements of the PSPDN.

TABLE 6/T.103

Recommended facilities

Facility	ISO/IEC 8208 [13] (Subclauses)
On-line Facility Registration	13.1
Fast Select Acceptance	13.17 (Note)
Network User Identification (NUI) related facilities	13.21
Calling Address Extension	14.1
Called Address Extension	14.2
NOTE – Recommendation T.105 [5] allows the use and non-use of the Fast Select facility in an outgoing call. If the Fast Select Acceptance facility is not required from a Videotex terminal, then the interworking between terminals that use and terminals that do not use the FS facility is not generally possible.	

6.3.2.15 Excluded Optional user facilities

The packet level optional user facilities shown in Table 7 shall not be used.

TABLE 7/T.103

Excluded facilities

Facility	ISO/IEC 8208 [13] (Subclauses)
Extended Packet Sequence Numbering	13.2
Packet Retransmission	13.4
Non-standard Default Packet sizes	13.9
Non-standard Default Window sizes	13.10
Bilateral Closed User Group related facilities	13.15
ROA Selection related facilities	13.23

7 Access to the ISDN virtual circuit service (X.31 Case B) through the B-channel

7.1 Coordination between B-channel and D-channel

7.1.1 General

ISDN videotex end-systems supporting access to ISDN virtual circuit services over the B-channel (X.31 [9] Case B) shall use a protocol stack at the S- or T- reference point in accordance with the standards as indicated in Figure 4 (see 4.3.2).

One stack is used to support signalling on the D-channel for circuit switched access to the packet handling function (PH) of the ISDN. In the case of the semi-permanent B-channel service, this stack is null. The other stack is used to support packet switched signalling and information transfer. The detailed protocols are given in 7.2.2 and 7.3.2.

Clause 11/CCITT Rec. T.105 [5] provides the definition of a Bearer Independent Service for syntax-based Videotex (SBV BIS) and the mapping of its elements to the protocol and procedures of ISO/IEC 8208 [13]. Additional requirements for calls originated by or directed toward the ISDN end-system are specified below. Co-ordination is only required for switched B-Channel ISDN connections between the end-system and the PH.

7.1.2 Outgoing calls

Additional procedures are required if a B-channel is not already established or if an additional B-channel is needed to support the additional traffic.

The reception by layer 3 of a BIS-N-CONNECT request primitive shall first cause the ISDN D-Channel signalling procedure for demand access to be used to establish a B-Channel as indicated in 7.3.

NOTE 1 – The “Called party number” information element of the SETUP message as defined in Recommendation Q.931 [7] is not used.

After a successful establishment of this B-channel connection, the procedures of clause 11/T.105 [5] shall apply.

NOTE 2 – The called address in the X.25 CALL REQUEST packet (derived from the BIS-N-CONNECT request primitive) is used for routing through the Access Network to the Access Function.

Failure to establish the channel connection is indicated to the BIS user by means of a BIS-N-DISCONNECT indication primitive with the originator parameter indicating “ISDN” and the reason parameter filled as indicated in 7.1.5.

7.1.3 Incoming calls

Additional procedures are required if an ISDN end-system interface has subscribed to the “Conditional notification” class, and the network uses the call offering procedures as described in 7.3.1.4 and 6.2.2.3.1/X.31 [9].

The ISDN call offering procedures determine which B-channel is to be used. If the network does not indicate an exclusive channel, the ISDN end-system may select (see Note) an already established B-channel. These procedures are not visible to the BIS user.

NOTES

1 Either the “point-to-point” configuration or the “point-to-multipoint” configuration support this B-channel negotiation.

2 It is not recommended that the terminal chooses an already established B-channel if the network indicates “preferred B-channel” (see Table 6-3/X.31, subclause 6.2.2.3.2 (SETUP message)).

3 A negotiation between idle B-channel and established B-channel presents technical difficulties from the network point of view. Nevertheless, in case of the “No notification” class, the network will have to use an already established B-channel to send an INCOMING CALL packet to the user (6.2.2/X.31 [9]). This seems to present similar technical difficulties for the network.

After the successful establishment of this B-channel connection, or successful selection of an already established B-channel, the procedures specified in 7.2.2 and 7.3.2 and in clause 11/T.105 [5] shall apply.

7.1.4 Clearing virtual circuits

It is recommended that the NL entity starts a timer T320 (see Recommendation Q.931 [7]) after the last SBV Network Connection has been released. This timer is cleared upon establishment of the next virtual circuit. Upon expiry of T320, clearing of the B-channel should be initiated.

These procedures are not visible to the BIS user.

7.1.5 Error handling

If one or more SBV Network Connections are established or in the process of being established on an established B-channel and that B-channel is disconnected, this disconnection shall be indicated to the BIS user by means of a BIS-N-DISCONNECT indication primitive with the originator parameter indicating "ISDN".

The reason parameter is as given in subclause 6.1.5 for each of the SBV Network Connections established or in the process of being established.

7.2 Layer 2 protocols

7.2.1 Layer 2 protocol for the D-channel

The base Recommendation for the layer 2 protocol of the D-channel is Recommendation Q.921 [6]. The provisions of Recommendation Q.921 [6] applicable to Data Link Connections between SAPs used for call control procedures (SAPI = 0) are valid without further application rules.

NOTE – The D-channel protocol is only applicable to switched ISDN connections between the terminal and the PH.

7.2.2 Layer 2 protocol for the B-channel

The base Recommendation for the layer 2 protocol in the B-channel is ISO 7776 [12]. The conformance requirements for the Data Link Layer in the B-channel shall be in accordance with the base Recommendation with respect to DTE/DCE operation, and subject to the additional requirements as detailed in the remainder of this subclause.

NOTE – CCITT X.25 [8] LAPB may also be taken as base Recommendation, however explicit references to subclauses are only made with respect to ISO 7776 [12] in this Recommendation.

7.2.2.1 Application rules

The application rules of Table 8 shall apply.

7.2.2.2 Implementation recommendations

The implementation recommendations for layer 2 of the B-channel are contained in Table 9.

7.3 Layer 3 protocols

7.3.1 Layer 3 protocol for the D-channel

7.3.1.1 The access protocol

The base Recommendation for the layer 3 protocol of the D-channel is Recommendation Q.931 [7]. The requirements of the base standards shall apply, subject to the provisions of Recommendation X.31 [9] (as far as applicable to terminals accessing the ISDN virtual circuit service over the B-channel), and subject to the provisions of the subsequent subclauses.

NOTES

- 1 The D-channel protocol is only applicable to switched ISDN connections between the terminal and the PH.
- 2 Annex F (normative) defines the messages for the control of packet-mode access connections.

7.3.1.2 Terminal addresses

Subclause 4.1/X.31 [9] shall apply. For the use of addressing supplementary services, refer to 7.3.1.6.

TABLE 8/T.103

Application rules for B-Channel layer 2

Case	Item	Application Rule
a	Single link procedure	Only the single link procedure shall be supported.
b	Independence of LAPB protocols	An independent LAPB protocol shall operate over each B-channel.
c	Data Link set-up	The responsibility for Data Link set-up depends on the notification class and on other agreements with the network provider. Table B.1 (informative) shows the different possibilities.
d	Maximum frame length Nl	Parameter Nl (maximum number of bits in an I-frame) shall be such that the Data Link layer is capable of carrying the maximum packet size negotiated at the packet level, plus the related packet level and Data Link level control information. Guidance on the derivation of the value of Nl can be found in Appendix II/X.25 [8].
e	Link set-up in FRMR condition	The DTE shall support the procedure of transmitting an FRMR response frame up to N2 times, if necessary. In order to get the DCE to reset the link.
f	Address assignment	The address assignment shall be as defined in 5.1/ISO 7776 [12].
g	Modes of operation	Basic (module 8) operation shall be supported.
h	Window size k	For parameter k (window size), the support of the value 7 is mandatory for basic operation.
i	Disconnection order	In the normal procedure for disconnection, the Data Link shall be disconnected before disconnecting the B-channel.
NOTE – The different draft functional standards specify the use of basic mode only. However, extended mode is not ruled out explicitly and is for further study.		

TABLE 9/T.103

Implementation recommendations for B-channel layer 2

Case	Item	Implementation recommendations
a	Parameter N2	For parameter N2 (maximum number of attempts) the value 10 is recommended.
b	Timer T1	It is recommended that the value of Timer T1 (retransmission) is tuneable in the range from 100 ms to 15 s.
c	I-frame acknowledgement	It is recommended that an RR frame be used as an acknowledgement of received I-frames, unless an outgoing I-frame is available.
d	Timer T3	If implemented, Timer T3 (disconnected) is recommended to be greater than or equal to $T1 \times 10$.
e	Timer T4	It is recommended to implement Timer T4.

7.3.1.3 Outgoing calls

The requirements of subclauses 4.3.2 and 6.1.2.1/X.31 [9] apply without modification.

NOTE – No called party number and no called party sub-address is contained in the SETUP message. Some networks may require the inclusion of the calling party number and/or calling party sub-address in the SETUP message.

The Bearer Capability information element shall be coded as indicated in Table 10. Fields not shown in the table shall be omitted.

Low Layer Compatibility and High Layer Compatibility information elements shall not be included in the SETUP message.

TABLE 10/T.103

Coding of the Bearer Capability information element

Octets	Information element field	Field value
1	Information element identifier	Bearer capability
2	Length of contents of information element	00000100
3	Coding standard	CCITT standardized coding
	Information transfer capability	Unrestricted digital information
4	Transfer mode	Packet mode
	Information transfer rate	00000: packet
6	User information layer 2 protocol	X.25 link layer
7	User information layer 3 protocol	X.25 packet layer

7.3.1.4 Incoming calls

To select a called terminal correctly, the terminal(s) at the user/network interface will be served with information generated by the calling terminal and the intermediate network(s).

The terminal selection functions and procedures are specified in Recommendation I.333 [2].

Annex B/Q.931 [7] specifies the procedure of compatibility checking as part of the access protocol. The information elements to be considered are those containing address information and the Bearer Capability information element.

The requirements of Annex B/Q.931 [7] shall apply. The following rules specify further details on terminal selection and compatibility checking and add requirements for Syntax-based Videotex terminals.

The result of this procedure is to decide, whether to ignore, to reject or to accept the incoming call.

a) *B.3.1/Q.931 [7]*

If a call is offered with address information, this information shall be checked against the local address before network-to-user compatibility checking. In this context, Note 1 of B.3.1/Q.931 [7] is not applicable.

In case of mismatch of any presented address information, no further compatibility checking is required and the call shall be ignored.

If no address information is offered, or the offered address information is not complete with respect to the local address (e.g. because the Sub-addressing supplementary service is subscribed, but the called subaddress is not offered), the terminal shall continue with network-to-user compatibility checking. It is not allowed to ignore a call for missing address information only.

b) *B.3.2/Q.931 [7]*

A terminal matches the received network-to-user information, if the information in the received Bearer Capability information element offered in the SETUP message is exactly as specified in Table 10 (i.e. fields not indicated in this table shall not be present).

If a mismatch is detected while checking the Bearer Capability information element, the terminal shall reject the call in accordance to 5.2.5.1/Q.931 [7]. It is not permitted to ignore the call.

c) *B.3.3/Q.931 [7]*

Received Low Layer Compatibility and High Layer Compatibility information elements shall be ignored.

d) *B.3.4/Q.931 [7]*

This subclause requires user actions to be carried out as result of compatibility checking. It is superseded by this Recommendation.

If a terminal has not rejected or ignored the call while following the procedures a), b), c) and d), it shall accept the call or reject it for other reasons (see below).

If a terminal is obliged to reject the call while following the procedures a) to d), the cause code to be used is defined in B.3/Q.931 [7].

If a terminal rejects the call for different reasons, it should indicate a cause from the following list:

- a) cause code #17: User busy (already involved in another call);
- b) cause code #47: Resources unavailable, unspecified;
- c) cause code #21: Call rejected (e.g. other local reasons apply).

If the terminal accepts the Incoming call, the co-ordination function initiates the appropriate Link Layer and Network Layer functions in the B-channel as detailed in 7. 1.

7.3.1.5 Release of the switched connection

Subclause 6.4.1/X31 [9] applies. However the terminal shall not release the switched connection while a virtual call is established or in the process of being established over the related B-channel.

NOTE – Further requirements on handling of failures or premature clearing of the switched connection can be found in the description of the co-ordination function in 7. 1.

7.3.1.6 Supplementary services

The use of supplementary services of a specific ISDN depends on provisions and requirements of the network.

The procedures for UUS are specified in Recommendation Q.931 [7].

The addressing supplementary services: DDI (Direct-Dialling-In), MSN (Multiple Subscriber Number) or SUB (Sub-addressing), or a combination of them, may be useful or even required by the network, if multiple terminals have been attached to the same ISDN address.

The TP (Terminal Portability) supplementary service shall not be used.

7.3.2 Layer 3 protocol for the B-channel

The base recommendation for the Network Layer in the B-channel is ISO/IEC 8208 [13]. The conformance requirements for the Network Layer in the B-channel shall be in accordance with the base recommendation with respect to DTE/DCE operation, and subject to the additional requirements as detailed in the remainder of this subclause,

NOTE – CCITT X.25 [8] PLP may also be taken as base recommendation, however explicit references to subclauses are only made with respect to ISO/IEC 8208 [13] in this Recommendation.

7.3.2.1 Bearer Independent Service

The service that the Network Layer entity provides to the Videotex application with respect to set-up, clear, reset of Network Connections and data transfer over established Network Connections, shall be as described in clause 11/T.105 [5].

7.3.2.2 Operation over multiple B-channels

If a terminal operates more than one B-channel, the Network Layer of each B-channel connection shall be processed independently from the Network Layer of each other B-channel connection.

7.3.2.3 DTE role

The Network Layer entity shall adopt the role of a DTE.

7.3.2.4 Logical channels to be used

The logical channel ranges (UC, HIC, LTC, HTC, LOC and HOC) to be used are determined by local knowledge. If local knowledge is not available, then by default only a single two-way logical channel shall be used (i.e. LTC and HTC will be set to 1, while LIC, HIC, LOC and HOC shall be set to zero). If more than one logical channel is available, a higher value of HTC may be negotiated using the On line Facility Registration facility.

If a DTE is capable of initiating a REGISTRATION request packet, then the registration parameters shall be set as follows:

- The LIC, HIC, LOC and HOC parameter shall be set to zero. The LTC shall be set to the value of 1. The value in the “total number of logical channels” parameter field shall be set equal to the value in the HTC parameter field.

7.3.2.5 Packet sizes

The Network Layer entity shall be capable of supporting the standard default packet size of 128 octets. The only permitted maximum data packet sizes are 128, 256, 512, 1024 and 2048 octets, Packet sizes other than the standard default packet size may be negotiated on a per call basis using the “Flow Control Parameter Negotiation” facility.

7.3.2.6 Default packet level window size

The Network Layer entity shall be capable of supporting the standard default window size of 2. Other window sizes may be negotiated on a per call basis using the “Flow Control Parameter Negotiation” facility.

7.3.2.7 Default throughput class

The default throughput class assigned to each direction of transmission shall be 64 kbit/s. Other default throughput class values may be agreed on a subscription basis. Other throughput classes may be negotiated on a per call basis using the “Throughput Class Negotiation” facility.

7.3.2.8 D-bit

The D-bit shall always be set to 0.

The Network Layer entity shall either ignore the D-bit in a received data packet, or treat as an error the occurrence of the D-bit set to 1 in a received data packet. If the Network Layer entity chooses to treat it as an error, it shall reset the logical channel indicating the cause “DTE originated” and the diagnostics “D-bit procedure not supported” (value = 166).

7.3.2.9 Q-bit

The Q-bit shall be set to the same value in all data packets of a complete data packet sequence to be transmitted.

The user data of a received complete data packet sequence shall be passed to the higher layers, if the Q-bit setting is the same in all packets of the sequence. Otherwise the Network Layer entity shall reset the logical channel indicating the cause “DTE originated” and the diagnostics “Inconsistent Q-bit settings” (value = 83).

7.3.2.10 Protocol identifier

The protocol identification in the Network Layer is described in the Technical Report ISO/IEC TA 9577 [15]. In ISO/IEC 8208 [13], the first octet of the call user data field within a CALL REQUEST/INCOMING CALL packet contains the “subsequent protocol identifier” (SPI) used to identify the higher layer protocols.

For the application of Videotex the bit pattern of the SPI is:

bit	8	7	6	5	4	3	2	1
	0	0	0	0	0	0	0	1

This bit pattern corresponds to “CCITT X.29” in Table 4/ISO/IEC TR 9577 [15].

In outgoing calls, the call user data field of the CALL REQUEST packet shall contain the above bit pattern as first octet.

In incoming calls, the above bit pattern shall be interpreted by the Network Layer entity that the Videotex application is requested.

The contents of remaining octets (besides the first octet) of the call user data field within an INCOMING CALL packet shall be ignored by the Network Layer entity.

7.3.2.11 Address fields

The CALL REQUEST packet shall contain the called DTE address, The encoding depends on the requirements of the PSPDN/ISDN. The use of the calling DTE address field is dependent on the requirements of the PSPDN/ISDN.

7.3.2.12 Data Link Disconnection Request

In the normal Procedure for clearing, all calls should be cleared before requesting the disconnection of the Data Link

7.3.2.13 Optional user facilities that shall be supported

The packet level optional user facilities that shall be supported by the terminal are shown in Table 11.

NOTE – For switched B-channel access. PSPDNs/ISDNs might offer only a restricted set of facilities (default profile), Thus. if a DTE (Videotex terminal) requests a specific facility, this might not be available or even cause the call to be cleared (e.g. flow control parameter negotiation is not allowed by the network).

TABLE 11/T.103

Supported packet level optional user facilities

Facility	ISO/IEC 8208 [13] (Subclauses)
Default Throughput Classes Assignment	13.11
Flow Control Parameter Negotiation	13.12
Throughput Class Negotiation	13.13

7.3.2.14 Recommended optional user facilities and CCITT specified DTE facilities

The packet level optional user facilities and CCITT specified DTE facilities that are shown in Table 12 are those for which implementation is recommended for greater flexibility. The use of the optional user facilities depends on operational requirements of the PSPDN/ISDN.

TABLE 12/T.103

Recommended facilities

Facility	ISO/IEC 8208 [13] (Subclauses)
On-line Facility Registration	13.1
Fast Select Acceptance	13.17 (Note)
Network User Identification (NUI) related facilities	13.21
Calling Address Extension	14.1
Called Address Extension	14.2
NOTE – Recommendation T.105 [5] allows the use and non-use of the Fast Select facility in an outgoing call. If the Fast Select Acceptance facility is not required from a Videotex terminal, then the interworking between terminals that use and terminals that do not use the FS facility is not generally possible.	

7.3.2.15 Excluded optional user facilities

The packet level optional user facilities shown in Table 13 shall not be used.

TABLE 13/T.103

Excluded facilities

Facility	ISO/IEC 8208 [13] (Subclauses)
Extended Packet Sequence Numbering	13.2
Packet Retransmission	13.4
Bilateral Closed User Group related facilities	13.15
Charging Information	13.22
ROA Selection related facilities	13.23

8 Access to the ISDN virtual circuit service (X.31 Case B) through the D-channel**8.1 Layer 2 protocol****8.1.1 The base Recommendation**

The base Recommendation for the layer 2 protocol in the D-channel is Recommendation Q.921 [6].

If call offering procedures including channel selection are implemented (see clause 4), the provisions of Recommendation Q.921 [6] applicable to Data Link Connections between SAPs used for call control procedures (SAPI=0) shall apply, with additional requirements indicated in the subsequent subclauses.

NOTE – Call offering over ISDN layer 2 procedures using SAPI = 16 are not supported.

A single Data Link Connection with SAPI = 16 shall be used to carry the packets of the Network Layer in numbered I-frames. The provisions of Recommendation Q.921 [6] shall apply with additional requirements as indicated in the subsequent subclauses.

8.1.2 Same Connection Endpoint Suffix (CES)

If call offering procedures are used, the CES shall be the same in the signalling phase and in the data transfer phase for a given communication.

8.1.3 Responsibility for Data Link set-up

The responsibility for Data Link set-up depends on the notification class and is agreed with the network. Table B.3 shows the different possibilities.

8.2 Layer 3 protocols

8.2.1 General

Two different protocols are applicable to Network Layer operations over the D-channel:

- 1) The protocol used to notify the NL entity of an incoming call
Additional procedures are required, if the ISDN end-system has subscribed to the “Conditional notification” class, and the network uses the call offering procedures as described in 8.2.2.4 and 8.2.2.5. These procedures are not visible to the BIS user.
- 2) The protocol used for packet data communications over the D-channel as described in 8.2.3.

8.2.2 Layer 3 ISDN signalling protocols

8.2.2.1 The base Recommendation

The base Recommendation for the layer 3 protocol of the D-channel used for notification of an incoming call is Recommendation Q.931 [7]. The requirements of the base standards shall apply, subject to the provisions of Recommendation X.31 [9] (as far as applicable to terminals accessing the ISDN virtual circuit service over the D-channel), and subject to the provisions of the subsequent subclauses.

NOTE – Annex F (normative) defines the messages for the control of packet-mode access connections and the coding of their information elements.

8.2.2.2 Terminal addresses

Subclause 4.1/X.31 [9] shall apply. For the use of addressing supplementary services see 8.2.2.6 below.

8.2.2.3 Outgoing calls

The protocol is not applicable for outgoing calls on the D-channel.

8.2.2.4 Incoming calls

To select a called terminal correctly, the terminal(s) at the user/network interface will be served with information generated by the calling terminal and the intermediate network(s).

The terminal selection functions and procedures are specified in Recommendation I.333 [2]. Compatibility checking for terminals supporting specific basic services is described in ETR 018 [(?)].

Annex B/Q.931 [7] specifies the procedure of compatibility checking as part of the access protocol. The information elements to be considered are those containing address information and the Bearer Capability information element.

The requirements of Annex B/Q.931 [7] shall apply. The following rules specify further details on terminal selection and compatibility checking and add requirements for Syntax-based Videotex terminals.

The result of this procedure is to decide, whether to ignore, to reject or to accept the incoming call.

a) B.3.1/Q.931 [7]

If a call is offered with address information, this information shall be checked against the local address before network-to-user compatibility checking. In this context, Note 1 of B.3.1/Q.931 [7] is not applicable.

In case of mismatch of any presented address information, no further compatibility checking is required and the call shall be ignored.

If no address information is offered, or the offered address information is not complete with respect to the local address (e.g. because the Sub-addressing supplementary service is subscribed, but the called subaddress is not offered), the terminal shall continue with network-to user compatibility checking. It is not allowed to ignore a call for missing address information only.

b) *B.3.2/Q.931 [7]*

A terminal matches the received network-to-user information, if the information in the received Bearer Capability information element offered in the SETUP message is exactly as specified in Table 14 (i.e. fields not indicated in this Table shall not be present).

If a mismatch is detected while checking the Bearer Capability information element, the terminal shall reject the call in accordance to 5.2.5.1/Q.931 [7]. It is not permitted to ignore the call.

c) *B.3.3/Q.931 [7]*

Received Low Layer Compatibility and High Layer Compatibility information elements shall be ignored.

d) *B.3.4/Q.931 [7]*

This subclause requires user actions to be carried out as result of compatibility checking. It is superseded by this Recommendation.

TABLE 14/T.103

Coding of the Bearer Capability information element

Octets	Information element field	Field value
1	Information element identifier	Bearer capability
2	Length of contents of information element	00000100
3	Coding standard	CCITT standardized coding
	Information transfer capability	Unrestricted digital information
4	Transfer mode	Packet mode
	Information transfer rate	00000: packet
6	User information layer 2 protocol	Recommendation Q.921/I.441
7	User information layer 3 protocol	Recommendation X.25 packet level

If a terminal has not rejected or ignored the call while following the procedures a), b), c) and d), it shall accept the call or reject it for other reasons (see below).

If a terminal is obliged to reject the call while following the procedures a) to d), the cause code to be used is defined in B.3/Q.931 [7].

If a terminal rejects the call for different reasons, it should indicate a cause from the following list:

- a) cause code #17: User busy (already involved in another call);
- b) cause code #47: Resources unavailable, unspecified;
- c) cause code #21: Call rejected (e.g. other local reasons apply).

If the terminal accepts the incoming call, the terminal initiates the appropriate Link Layer and Network Layer functions in the D-channel as detailed in 8.1 and 8.2.3.

8.2.2.5 Release of the call

Subclause 6.2.2.3.1/X.31 [9] applies with respect to selection of the D-channel.

NOTE – After having received the CONNECT message from the accepting terminal, the network will release the call with a RELEASE message containing cause code #7 “call awarded and being delivered in an established channel”.

8.2.2.6 Supplementary services

The use of supplementary services of a specific ISDN depends on provisions and requirements of the network.

The procedures for UUS are specified in Recommendation Q.931 [7].

The addressing supplementary services: DDI (Direct-Dialling-In), MSN (Multiple Subscriber Number) or SUB (Sub-addressing), or a combination of them, may be useful or even required by the network, if multiple terminals have been attached to the same ISDN address.

The TP (Terminal Portability) supplementary service shall not be used.

8.2.3 Layer 3 data communication protocol

The base Recommendation for the Network Layer in the D-channel is ISO/IEC 8208 [13]. The conformance requirements for the Network Layer in the D-channel shall be in accordance with the base Recommendation with respect to DTE/DCE operation, and subject to the additional requirements as detailed in the remainder of this subclause.

NOTE – CCITT X.25 [8] PLP may also be taken as base Recommendation, however explicit references to subclauses are made in this Recommendation only with respect to ISO/IEC 8208 [13].

8.2.3.1 Bearer Independent Service

The service that the Network Layer entity provides to the Videotex application with respect to set-up, clear, reset of Network Connections and data transfer over established Network Connections, shall be as described in clause 11/T.105 [5].

8.2.3.2 Operation over p-Data Link Connections

The Network Layer entity shall operate over a single p-Data Link Connection (SAPI = 16).

If a terminal supports more than one TEI, the Network Layer entity of each p-Data Link Connection shall be processed independently from the Network Layer entities of the other p-Data Link Connections.

8.2.3.3 DTE role

The Network Layer entity shall adopt the role of a DTE.

8.2.3.4 Logical channels to be used

The logical channel ranges (LIC, HIC, LTC, HTC, LOC and HOC) to be used are determined by local knowledge. If local knowledge is not available, then by default only a single two-way logical channel shall be used. (i.e. LTC and HTC will be set to 1, while LIC, HIC, LOC and HOC shall be set to zero). If more than one logical channel is available, a higher value of HTC may be negotiated using the On-line Facility Registration facility.

If a DTE is capable of initiating a REGISTRATION request packet, then the registration parameters shall be set as follows:

- The LIC, HIC, LOC and HOC parameter shall be set to zero. The LTC shall be set to the value of 1. The value in the “total number of logical channels” parameter field shall be set equal to the value in the HTC parameter field.

8.2.3.5 Packet sizes

The Network Layer entity shall be capable of supporting the standard default packet size of 128 octets. The only permitted maximum data packet sizes are 128 and 256 octets. Packet sizes other than the standard default packet size may be negotiated on a per call basis using the “Flow Control Parameter Negotiation” facility.

8.2.3.6 Default packet level window size

The Network Layer entity shall be capable of supporting the standard default window size of 2. Other window sizes may be negotiated on a per call basis using the “Flow Control Parameter Negotiation” facility.

8.2.3.7 Default throughput class

The default throughput class assigned to each direction of transmission shall be 9.6 kbit/s. Other default throughput class values may be agreed on a subscription basis.

Other throughput classes may be negotiated on a per call basis using the “Throughput Class Negotiation” facility. The maximum negotiable throughput class shall be 9.6 kbit/s at the Basic Rate Inter-face, and 64 kbit/s at the Primary Rate Interface.

8.2.3.8 D-bit

The D-bit shall always be set to 0.

The Network Layer entity shall either ignore the D-bit in a received data packet, or treat as an error the occurrence of the D-bit set to 1 in a received data packet. If the Network Layer entity chooses to treat it as an error, it shall reset the logical channel indicating the cause “DTE originated” and the diagnostics “D-bit procedure not supported” (value = 166).

8.2.3.9 Q-bit

The Q-bit shall be set to the same value in all data packets of a complete data packet sequence to be transmitted.

The user data of a received complete data packet sequence shall be passed to the higher layers, if the Q-bit setting is the same in all packets of the sequence. Otherwise the Network Layer entity shall reset the logical channel indicating the cause “DTE originated” and the diagnostics “Inconsistent Q-bit settings” (value = 83).

8.2.3.10 Protocol identifier

The protocol identification in the Network Layer is described in the Technical Report ISO/IEC TR 9577 [15]. In ISO/IEC 8208 [13], the first octet of the call user data field within a CALL REQUEST/INCOMING CALL packet contains the “subsequent protocol identifier” (SPI) used to identify the higher layer protocols.

For the application of Videotex the bit pattern of the SPI is:

bit	8	7	6	5	4	3	2	1
	0	0	0	0	0	0	0	1

This bit pattern corresponds to “CCITT X.29” in Table 4/ISO/IEC TR 9577 [15].

In outgoing calls, the call user data field of the CALL REQUEST packet shall contain the above bit pattern as first octet.

In incoming calls, the above bit pattern shall be interpreted by the Network Layer entity that the Videotex application is requested.

The contents of remaining octets (besides the first octet) of the call user data field within an INCOMING CALL packet shall be ignored by the Network Layer entity.

8.2.3.11 Address fields

The CALL REQUEST packet shall contain the called DTE address. The encoding depends on the requirements of the PSPDN/ISDN. The use of the calling DTE address field is dependent on the requirements of the PSPDN/ISDN.

8.2.3.12 Data Link Disconnection Request

In the normal procedure for clearing, all calls should be cleared before requesting the disconnection of the Data Link.

8.2.3.13 Optional user facilities that shall be supported

The packet level optional user facilities that shall be supported by the terminal are shown in Table 15.

NOTE – For switched B-channel access, PSPDNs/ISDNs might offer only a restricted set of facilities (default profile). Thus, if a DTE (Videotex terminal) requests a specific facility, this might not be available or even cause the call to be cleared (e.g. flow control parameter negotiation is not allowed by the network).

TABLE 15/T.103

Supported packet level optional user facilities

Facility	ISO/IEC 8208 [13] (Subclauses)
Default Throughput Classes Assignment	13.11
Flow Control Parameter Negotiation	13.12
Throughput Class Negotiation	13.13

8.2.3.14 Recommended optional user facilities and CCITT specified DTE facilities

The packet level optional user facilities and CCITT specified DTE facilities that are shown in Table 16 are those for which implementation is recommended for greater flexibility. The use of the optional user facilities depends on operational requirements of the PSPDN/ISDN.

TABLE 16/T.103

Recommended facilities

Facility	ISO/IEC 8208 [13] (Subclauses)
On-line Facility Registration	13.1
Fast Select Acceptance	13.17 (Note)
Network User Identification (NUI) related facilities	13.21
Calling Address Extension	14.1
Called Address Extension	14.2
NOTES 1 Recommendation T.105 [5] allows the use and non-use of the Fast Select facility in an outgoing call. If the Fast Select Acceptance facility is not required from a Videotex terminal, then the interworking between terminals that use and terminals that do not use the FS facility is not generally possible. 2 The recommended facilities are equal to those taken for Case B/B-channel. T/ 1221 recommends no facilities at all. The difference should be discussed.	

8.2.3.15 Excluded optional user facilities

The packet level optional user facilities shown in Table 17 shall not be used.

TABLE 17/T.103

Excluded facilities

Facility	ISO/IEC 8208 [13] (Subclauses)
Extended Packet Sequence Numbering	13.2
Packet Retransmission	13.4
Bilateral Closed User Group related facilities	13.15
Charging Information	13.22
ROA Selection related facilities	13.23
NOTE – The excluded facilities are equal to those taken for Case B/B-channel. T/1221 excludes only extended packet sequence numbering. The difference should be discussed.	

Annex A

(informative)

ISDN lower layer communication modes for syntax-based Videotex

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

The X.25-based ISDN end-system may have one or several possibilities to establish a communication with another end-system. DTE/DTE mode of communication, X.31 Case A access, X.31 Case B/B-channel access, or X.31 Case B/D-channel access.

For Videotex end-systems, establishment and release of channel connections and data transfer on these connections is provided by the SBV Bearer Independent Service (SBV BIS) defined in Recommendation T.105 [5] through the use of Virtual Circuit services of the X.25 [8] Packet Layer Protocol (X.25/PLP).

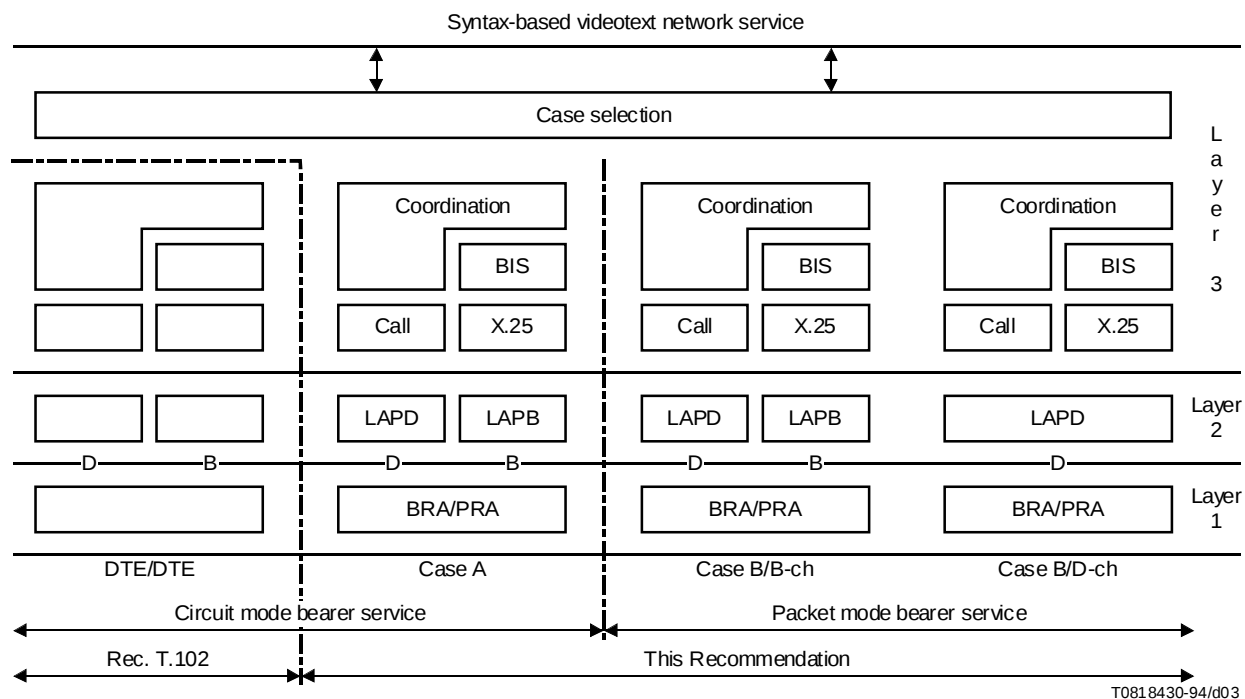
Moreover, the ISDN interface may require some coordination between the signalling ISDN protocol (the out-of-band protocol) and the X.25 [8] protocol (the in-band protocol). The procedures for this coordination depend on the communication case selected.

Figure A.1 presents the structure of the lower layers for the four cases considered above:

Upon the reception of a BIS-N-CONNECT request primitive from the higher layers, or in the case of incoming calls, the Network Layer entity may have to choose among the possibilities for case selection implemented in the ISDN end-system, or may at least have to check the compatibility between the request and these possibilities.

In the case of simultaneous multiple network connections, different modes of communication may be used for each of them, e.g. the D-channel for alphamosaic data and a B-channel for photographic data.

Annex B (informative) describes the parameters which may influence the access to X.25 [8] packet services and the selection of a particular mode of communication.



Coordination	Refer to the coordination function described in subclauses 6.1, 7.1 and clause 8
BIS	Refer to the syntax-based videotex independent bearer service defined in Recommendation T.105 [5]
Call	Refer to the basic call control procedures defined in Recommendation Q.931 [7]
X.25	Refer to the network layer protocol defined in ISO/IEC 8208 [13]
LAPD	Refer to the ISDN data link layer defined in Recommendation Q.921 [6]
LAPB	Refer to the HDLC procedures defined in ISO 7776 [12]
BRA/PRA	Refer to the physical network-user interfaces for either Basic Rate Access (BRA) or Primary Rate Interface (PRA) as defined in Recommendation I.430 [3] or Recommendation I.431 [4], respectively

FIGURE A.1/T.103
ISDN lower layers for ISDN syntax-based videotex

Annex B

(informative)

Overview on communication establishment parameters

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

B.1 General

A terminal equipment (acting as a Videotex terminal or a Videotex access function) may have several possibilities to access the X.25 [8] packet service at the S/T reference point. These possibilities are determined by parameters which have to be fixed either at subscription time or dynamically when using the access.

Subclause B.2 presents the parameters involved and their possible usage.

Subclause B.3 presents the parameters involved in the case selection and highlight when a coordination is needed between the two protocol stacks of out-band signalling (Recommendation Q.931 [7] protocol) and in-band signalling (X.25 [8] protocol).

B.2 X.25 packet service access

B.2.1 X.25 packet service access parameters

Recommendation X.31 [9] allows several possibilities to access the X.25 [8] packet services. The options applicable to this Recommendation are listed below. These options depend on several parameters indicated in Table B.1. The values of these parameters may be combined as detailed in Tables B.2 and B.3. Only virtual circuit services are within the scope of this Recommendation.

TABLE B.1/T.103

Parameters influencing the access of X.25 [8] packet services over an ISDN

Parameter	Values	Comment
B-channel access type	Semi-permanent Switched	B-channel connection is set up at subscription time and the physical layer is kept activated by the network in case of a basic rate interface. Q.931 [7] procedures are used to set up and to disconnect a B-channel.
Notification class	No notification Conditional notification	As defined in Recommendation X.31 [9].
In band Layer 2 activation type (B- or D-channel)	Semi-permanent User demand Originator demand	Layer 2 is activated at subscription time and held activated by the network. The user is responsible to set up the data link (the PH will clear an INCOMING CALL if the data link is not activated). The responsibility for the data link set-up depends on the direction of the first virtual call.
TEI assignment	Fixed Dynamic	TEI fixed at subscription time. Dynamic TEI assignment using Recommendation Q.921 [6] procedures.
X-25 packet service type	Customized Identified Non-identified	As defined in Recommendation X.32 [10].

B.2.2 Access of X.25 packet services over the B-channel (X.31 Case A or Case B)

Table B.2 shows the valid parameter combinations to access X.25 [8] packet services over the B-channel.

TABLE B.2/T.103

Parameter combinations for B-channel services

Notification class	B-channel access type	Layer 2 activation	X.25 packet service types
No notification (Note)	Semi-permanent	User demand	Customized, Identified
		Semi-permanent	Customized, Identified
	Switched	User or Network, after layer 1 activation by the user	Customized, Identified, Non-identified
Conditional notification	Semi-permanent	Originator demand	Customized, Identified
	Switched	Originator demand	Customized, Identified, Non-identified
NOTE – The definition of notification classes given in Recommendation X.31 [9] does not precise whether semi-permanent B-channels are concerned in combination with the “conditional notification” class. However, the three possibilities of B-channel layer 2 activation have to be considered.			

B.2.3 Access of X.25 packet services over the D-channel (X.31 Case B)

Table B.3 shows the valid parameter combinations to access X.25 [8] packet services over the D-channel.

TABLE B.3/T.103

Parameter combinations for D-channel services

Notification class	Layer 2 activation	TEI allocation	X.25 packet service types
No notification	Semi-permanent	Fixed TEI	Customized, Identified
	Originator demand	Fixed TEI	Customized, Identified
	Originator demand	Dynamic TEI	Customized, Identified, Non-identified
Conditional notification	Originator demand	Dynamic TEI	Customized, Identified, Non-identified

B.3 Case selection for communication establishment

B.3.1 Outgoing calls

The different parameters that may influence the choice of an access case among the three possibilities of Recommendation X.31 [9] are summarized in Table B.4.

TABLE B.4/T.103

Selection of the access type for outgoing calls

Case selection				X.25 packet service access	
Bearer service	Selected channel		Called address	Access case	Coordination function
	Type	Selected by			
Circuit mode	Semi-permanent B-channel (Note 1)	User	X.25	X.31 Case A, (Note 2)	None
Packet mode	Semi-permanent B-channel (Note 1)	User	X.25	X.31 Case B, B-channel	None
Circuit mode	Idle B-channel	User or Network (Note 3)	ISDN and X.25 (Note 4)	X.31 Case A or DTE/DTE, (Note 5)	Subclause 6.1 or T.102
Packet mode	Idle B-channel (Note 3)	User or Network	X.25 (Note 6)	X.31 Case B, B-channel	Subclause 7.1
Circuit mode	On demand established B-channel	User	ISDN and X.25 (Notes 4 and 7)	X.31 Case A or DTE/DTE, (Note 5)	None
Packet mode	On demand established B-channel	User	X.25	X.31 Case B, B-channel	None
Packet mode	D-channel	User	X.25	X.31 Case B, D-channel	None
NOTES 1 The two semi-permanent B-channel types as defined in clause 6/X.31 [9] are included here (see also Figure B.1). If the B-channel is not established at this moment, the BIS provider will respond with a BIS-N-DISCONNECT indication to the BIS user. 2 Semi-permanent B-channels are excluded in the DTE/DTE case. 3 The call procedures used by the coordination function allow B-channel negotiation with the network. 4 The ISDN address is the one of the AU or the remote ISDN DTE. This address may be absent in case of a hot line (direct call). The X.25 address may be absent if the B-channel is connected to a remote ISDN DTE. 5 More parameters may be required to determine which interface can be used. 6 Although Recommendation Q.931 [7] call procedures are used, there is no need for an ISDN address. 7 The ISDN address has been used to establish the B-channel and is not required for a new virtual circuit establishment.					

NOTE – Where relevant, the access DTE/DTE case is also indicated for information.

The reception of a BIS-N-CONNECT request primitive by layer 3 requires a channel selection:

This selection is performed by the user. Nevertheless, the user may offer the network to select a B-channel among the idle ones when using the Recommendation Q.931 [7] procedures to establish this B-channel.

When using the Recommendation Q.931 [7] procedures, a coordination function is required to establish a layer 1 B-channel before using the X.25 [8] protocols.

When an already established B-channel (either semi-permanent or on demand) is selected, or when the D-channel is selected, the type of interface is determined by the parameters associated to this channel.

Whereas, when establishing a new B-channel, the mode of operation depends on the network bearer service requested, i.e. circuit mode or packet mode. If circuit mode bearer service is selected, the ISDN end-system needs to know the characteristics of the ISDN end-system to be called: Access Unit (Case A).

When requesting a bearer service on a B-channel, the network, even if it does not support this bearer service, will reply using the Recommendation Q.931 [7] procedures to indicate whether the operation is successful or not. Whereas, when requesting the packet mode bearer service on the D-channel, the network may not reply.

The method by which the access type is determined is a local matter and is outside the scope of this Recommendation.

B.3.2 Incoming calls

Tables B.5 and B.6 summarize the possible selections of interface types in case of incoming calls when the user has subscribed to the “No notification” class or the “Conditional notification” class, respectively. These tables take the three possibilities of Recommendation X.31 [9] interfaces and the DTE/DTE interface into account.

TABLE B.5/T.103

Selection of the access type for incoming calls in the “No notification” class

Case selection			X.25 packet service access	
Bearer service	Selected channel		Interface type	Coordination function
	Type	Originator		
Circuit mode	Semi-permanent B-channel (Notes 1 and 2)	AU	X.31 Case A (Note 3)	None
Packet mode	Semi-permanent B-channel (Notes 1 and 2)	Network	X.31 Case B B-channel	None
Circuit mode	On demand established B-channel	Network or AU	X. 31 Case A or DTE/DTE (Note 4)	None
Packet mode	On demand established B-channel	Network or AU	X.31 Case B B-channel	None
Circuit mode	Idle B-channel	Network or user (Note 5)	DTE/DTE	T.102
Packet mode	D-channel	Network	X.31 Case B D-channel	None
NOTES 1 The two semi-permanent B-channel types defined in clause 6/X.31 [9] are included here (see also Figure B.1). 2 The ISDN shall maintain the physical layer of the B-channel. If not established when the incoming call arrives, the AU/PH may clear this incoming call. Activation of layer 2 on the B-channel is made as indicated in Table B.2. 3 Semi-permanent B-channels are excluded in the DTE/DTE case. 4 The interface type of this B-channel has been determined when establishing it for the first outgoing/incoming call. 5 The call procedures of Recommendation Q.931 [7] allow a B-channel negotiation between the network and the user only for “point to point” configurations, either basic or primary rate access. For a basic rate access in “multi-point” configuration the network only selects the B-channel.				

TABLE B.6/T.103

Selection of the access type for incoming calls in the “Conditional notification” class

Case selection			X.25 packet service access	
Bearer service	Selected channel		Interface type	Coordination function
	Type	Originator		
Circuit mode	Semi-permanent B-channel (Note 1)	AU	X.31 Case A (Note 2)	None
Packet mode	Semi-permanent B-channel (Note 1)	Network	X.31 Case B B-channel	None (Note 3)
Circuit mode	On demand established B-channel	Network or AU	X.31 Case A or DTE/DTE (Note 4)	None
Packet mode	On demand established B-channel	Network or user (Note 5)	X.31 Case B B-channel (Note 4)	Subclause 7.1 (Note 2)
Circuit mode	Idle B-channel	Network or user (Note 6)	X.31 Case A or DTE/DTE (Note 7)	Subclause 6.1 or T.102
Packet mode	Idle B-channel	Network or user (Note 6)	X.31 Case B B-channel (Note 7)	Subclause 7.1
Packet mode	D-channel	Network or user (Note 5)	X.31 Case B D-channel	None (Note 5)

NOTES

1 The two semi-permanent B-channel types defined in clause 6/X.31 [9] are included here, but the definition of the “Conditional notification” class may not concern semi-permanent B-channel. Activation of layer 2 on the B-channel is made as indicated in Table B.2.

2 Semi-permanent B-channels are excluded in Recommendation T.102.

3 Networks conforming to Recommendation X.31 [9] do not offer the possibility of selecting a semi-permanent B-channel with the signalling procedures of the D-channel. This possibility is under study within CCITT study groups.

4 The interface type of this B-channel has been determined when establishing it for the first outgoing/incoming call.

5 Call offering procedures allow the user to select an already established B-channel or the D-channel, even in “multi-point configuration”. If no call offering procedures are used, then the network only shall select the channel, and no coordination function is required.

6 The call procedures of Recommendation Q.931 [7] allow a B-channel negotiation between the network and the user only for “point to point” configurations, either basic or primary rate access. For a basic rate access in “multi-point” configuration, the network only selects the B-channel.

7 The call set-up message may give some information on the calling ISDN system (i.e. AU or remote DTE).

The BIS-N-CONNECT indication will always be issued to the BIS user on the reception of an incoming call packet.

When no coordination function is required to receive the incoming call packet, the interface type is selected by the ISDN or the remote ISDN end-system (AU or DTE) and is already available within the called ISDN end-system.

If the ISDN end-system does not support D-channel packet handling, it may not respond to a network request (SABME with SAPI = 16).

When the ISDN requires coordination with call procedures of Recommendation Q.931 [7] or Recommendation X.31 [9], the following steps have to be performed:

- *Compatibility checking of the SETUP message* – The Recommendation Q.931 [7] NL entity shall check the contents of the information elements in the SETUP message (especially Called party number or Called party sub-address, BC and LLC) with the possibilities of the ISDN end-system.

NOTE – The ISDN uses this compatibility checking to select a TE1 in a “multi-point configuration”.

- *Interface type selection* – Once the SETUP is acceptable, further investigations may be required to be able to send the CONNECT message to the network. These may include channel selection between B-channel or D-channel, between idle or established B-channels, or the determination whether the SETUP has been sent by an AU or a remote ISDN DTE. This selection, which may use the contents of information elements such as called/calling party number/sub-address, is, however, a local matter and is outside the scope of this Recommendation.

NOTE – Under certain conditions (e.g. interworking with PSTN), the ISDN called system may confuse a remote ISDN calling DTE with a calling AU, and, as a consequence, accept the incoming call as an X.31 Case A interface. Since data link addresses (A/B) are not compatible, the layer 2 activation on the B-channel will not succeed in this case.

- *Coordination between Recommendation Q.931 [7] procedures and X.25 [8] procedures* – After successful completion of Recommendation Q.931 [7] procedures, the procedures for X.25 [8] layers 2 and 3 shall apply.

When an ISDN end-system has subscribed to the “No notification” class, a coordination function is never required, except for the case that a SETUP message has been received from a remote DTE.

When an ISDN end-system has subscribed to the “Conditional notification” class, a coordination function will be required by the network to select a channel or a TE1 among those of a multi-point configuration, or will be required by a remote DTE to establish a new B-channel.

If the network cannot transmit the incoming call packet while using the call offering procedures of Recommendation Q.931 [7] or Recommendation X.31 [9], because no B-channel is available, the BIS user of the called ISDN end-system is not informed of this attempt to establish a communication.

Annex C (informative)

End-to-end system configurations

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

C.1 Introduction

The protocols and usage of supplementary services as specified in this Recommendation shall satisfy the requirements of Recommendation T.105 [5] defining the end-to-end protocols for the syntax-based Videotex service.

The purpose of this annex is to clarify possible end-to-end environments in terms of the networks and the different types of end-systems concerned.

C.2 Network configurations

The scope of this Recommendation implies that at least one end of the communication is on an ISDN. The usage of packet mode may involve PSPDN in many communications.

An ISDN may interwork with a PSPDN in different ways:

- via an Access Unit (AU) to the PSPDN;
- via an interworking function between the packet mode bearer service in the ISDN and a PSPDN.

Figures C.1 to C.7 illustrate some different configurations that may be used between two end-to-end Videotex systems.

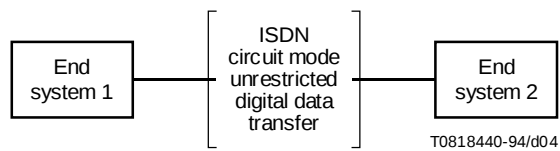


FIGURE C.1/T.103
Circuit mode ISDN

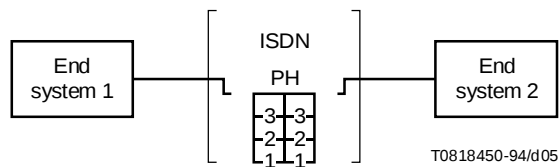


FIGURE C.2/T.103
Packet mode ISDN

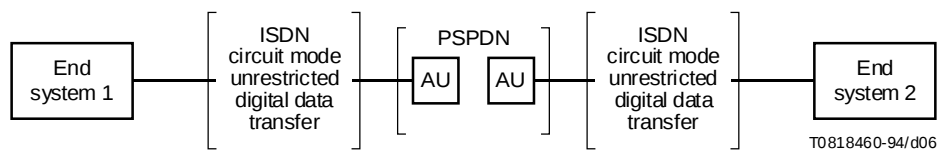


FIGURE C.3/T.103
Circuit mode ISDN to circuit mode ISDN

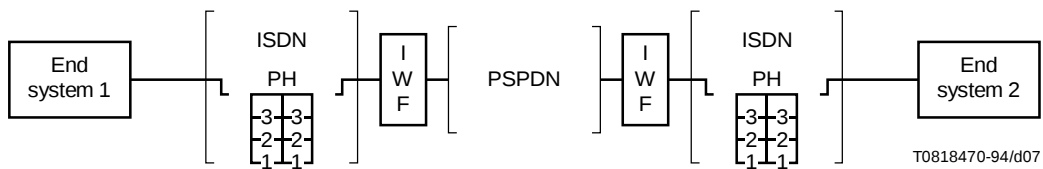


FIGURE C.4/T.103
Packet mode ISDN to packet mode ISDN

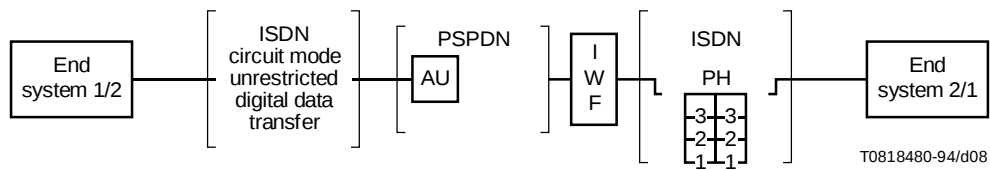


FIGURE C.5/T.103
Circuit mode ISDN to packet mode ISDN or vice-versa

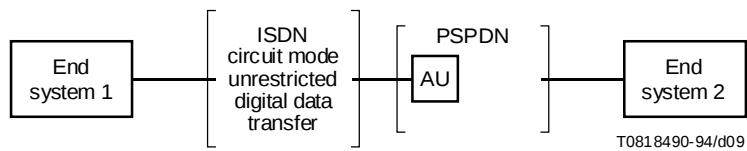


FIGURE C.6/T.103
Circuit mode ISDN to PSPDN

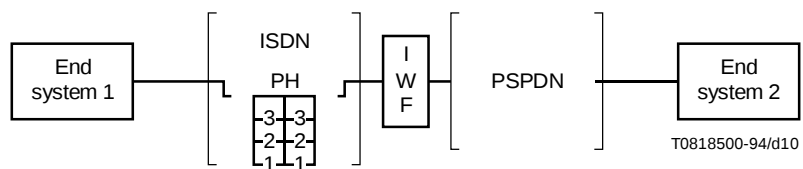


FIGURE C.7/T.103
Packet mode ISDN to PSPDN

C.3 Types of interfaces at the two end-systems

In the network configurations described in C.2, several types of interfaces have to be used by end-systems:

- *Recommendation X.25*
The system has a permanent connection to a PSPDN.
- *DTE/DTE*
The system is connected to the ISDN and uses DTE/DTE protocols on the B-channel for packet data transfer. The B-channel is established on demand.
- *X.31 Case A*
The system is connected to the ISDN and uses DTE/DCE protocols on the B-channel for packet data transfer, the DCE is outside the ISDN. The B-channel is established permanently or on demand.
- *X.31 Case B/B-channel*
The system is connected to the ISDN and uses DTE/DCE protocols on the B-channel for packet data transfer. The DCE is inside the ISDN. The B-channel is established permanently or on demand.
- *X.31 Case B/D-channel*
The system is connected to the ISDN and uses DTE/DCE protocols on the D-channel for packet data transfer. The DCE is inside the ISDN. The link layer over the D-channel is established permanently or on demand.

Table C.1 illustrates the interfaces which may be used at the two ends of a packet mode communication and the corresponding network configurations available.

Except for the case of DTE/DTE, each side of the communication in Table C.1 handles the channel establishment (permanent or on demand) independently from the other side.

TABLE C.1/T.103

Interfaces at the two Videotex end-systems

End-system 1	End-system 2				
	DTE/DTE B-channel	X. 31 Case A B-channel	X.31 Case B B-channel	X. 31 Case B D-channel	X.25
DTE/DTE B-channel	Figure C.1 (Note)	–	–	–	–
X.31 Case A B-channel	–	Figure C.3	Figure C.5	Figure C.5	Figure C.6
X.31 Case B B-channel	–	Figure C.5	Figure C.2 Figure C.4	Figure C.2 Figure C.4	Figure C.7
X.31 Case B D-channel	–	Figure C.5 Figure C.4	Figure C.2 Figure C.4	Figure C.2	Figure C.7
NOTE – This case is outside the scope of this Recommendation, and is treated in Recommendation T.102.					

C.4 End-system characteristics

The layer 7 protocol defined in Recommendation T.105 [5] has identified several entities to describe a communication model:

- the terminal is connected to the Access Network via the Terminal Function (TF);
- the Videotex Service is connected to the Access Network via the Access Function (AF).

As the Videotex protocol on layer 7 is not symmetrical, an end-system can work as a TF or an AF. If two terminals want to communicate, one should act as an AF. The structure of the Videotex service – Access Function and Host Function in the same place, Access Function within a Videotex Access Point, etc. – has no influence on the characteristics of the end-system.

An end-system, whenever it acts as a TF or AF, can initiate the communication (calling) or respond to a call (called).

Table C.2 illustrates the different possibilities of the end-systems, and, for each case, its preferred use.

TABLE C.2/T.103

End-system characteristics

Characteristics		Possibilities				Preferences			
Interface	Channel establishment	TF		AF		TF		AF	
		Calling	Called	Calling	Called	Calling	Called	Calling	Called
DTE/DTE B-channel	On demand	X	X	X	X	1			1
X.31 Case A B-channel	On demand Permanent	X X	X X	X X	X X	2			1 1
X.31 Case B B-channel	On demand Permanent	X X	X X	X X	X X	1 2			1
X.31 Case B D-channel	On demand Permanent	X X	X X	X X	X X	1 1			2
X.25		X			X				1
TF Terminal function AF Access function X Possible 1 Higher preference 2 Lower preference									

Annex D

(normative)

Additional provisions for Recommendation X.31

(This annex forms an integral part of this Recommendation)

D.1 General

The deviations (restrictions, additions, precisions) to Recommendation X.31 apply only in the context of this Recommendation.

D.2 Subclause 2.2/X.31: Configuration for the ISDN virtual circuit service (Case B)

Precision concerning the connection between the ET and the PH in Figure 2-3/X.31:

- This connection is either on demand or semipermanent, but has no relevance for the user-network procedures. Only internal procedures between the ET and the PH are required.

D.3 Subclause 3.2.3.2/X.31: Conditional notification class

This conditional notification class applies to both the B- and the D-channel incoming call offerings. In this case the network shall allocate incoming calls to a channel (D/B) using a network dependent algorithm.

Some networks may also, on a user's profile basis, compare the sub-address and use call offering procedure only if the ISDN address differs from the ISDN address of the terminal with the active packet access channel.

D.4 Subclause 3.2.3.3/X.31: Unconditional notification class

The unconditional notification class is not supported.

D.5 Subclause 3.2.3.4/X.31: Information mapping from the X.25 incoming call packet to the Q.931 message

The unconditional notification class is not supported.

D.6 Subclause 4.1/X.31: Terminal and interface selection

The Note does not apply.

The transmission capability information is used in accordance to 3.2/Q.931.

D.7 Subclause 6.1.1/X.31: Circuit-switched access to PSPDN services (Case A)

Table 6-1/X.31:

- In the case of primary rate access (PRA), the field “channel indication” shall be “channel number”. The D-channel indicator shall be coded as following:
 - 0 to indicate No;
 - 1 to indicate Yes.

The information transfer capability of the Bearer capability information element included in the SETUP message shall be set to “unrestricted digital information”.

The user may specify the layer 1, layer 2 and layer 3 information transfer protocols not only in the Low layer compatibility element, but also in the Bearer capability information element in the SETUP message.

D.8 Subclause 6.1.2.1/X.31: B-channel

Some networks may require the calling party number and calling party sub-address information elements to be included in the SETUP message to select a specific user profile.

D.9 Subclause 6.2.1.2/X.31: Channel selection

The information transfer capability of the Bearer capability information element included in the SETUP message shall be set to “unrestricted digital information”.

The AU may also specify the layer 1 (e.g. rate adaption), layer 2 (i.e. LAPW), and layer 3 (i.e. Recommendation Q.931) information transfer protocols in the Low layer compatibility information element or the Bearer capability information element in the SETUP message (see Annex L/Q.931 “Low layer information coding principles”).

Table 6-2/X.31:

- In the case of primary rate access (PRA), the field “channel indication” shall be “channel number”. The D-channel indicator shall be coded as following:
 - 0 to indicate No;
 - 1 to indicate Yes.

D.10 Subclause 6.2.2.1/X.31: B-channel

Additional exceptions for the B-channel:

- The procedures for channel selection are specified in Table 6-3/X.31.

Table 6-3/X.31:

NOTE – Public networks conforming this Recommendation do not offer the negotiation between B- and D-channel. Networks which do not support B-channel negotiation shall offer the incoming call by indicating either Bi Exclusive, No D-channel or No channel Exclusive, D-channel, in the SETUP message.

- In the case of primary rate access (PRA), the field “channel indication” shall be “channel number”. The D-channel indicator shall be coded as following:
0 to indicate No;
1 to indicate Yes.

D.11 Subclause 6.2.2.3.1/X.31: Channel selection through call offering

The layer 3 messages are defined in 3.2/Q.931.

On the D-channel of a user access, for a given communication the same connection endpoint suffix (CES) value as the one used by the selected terminal during the signalling phase (SAPI s) shall be used for data transfer over the D-channel (using SAPI p).

Note 2 shall not apply.

The information transfer capability shall be set to “unrestricted digital information” in any case.

The option by which, in 6.2.2.3.1/X.31 and 6.2.2.3.1/Q.931, the network may offer SAPI = 16 broadcast call offering procedures for providing and supporting Q.931 signalling procedures is not recommended.

D.12 Subclause 6.2.2.3.2/X.31: Information element mapping

Table 6-4/X.31:

- The A-bit is not supported.
- Except for the “calling/called address (extension)”, the corresponding information elements in the Q.931 SETUP message are not applicable.

NOTE – The network will map bits 8 and 7 of the first octet of the “Called address extension” facility parameter field in the X.25 incoming call packet to the “Type of sub-address” field in octet 3 of the “Called party sub-address” information element in the Q.931 SETUP message, assuming that the X.25 incoming call packet is coded based on the 1988 version of Recommendation X.25. Therefore, the called user could notice that the received “Type of sub-address” might not be correct when the X.25 incoming call packet is coded based on the 1984 version of Recommendation X.25.

D.13 Subclause 6.4.1/X.31: B-channel

The restart message in Case B can be related to the particular B-channel or to the whole interface.

D.14 Subclause 7.3.2/X.31: Rate adaption

Item 1) is also applicable for rate adaption using circuit mode of operation (Case A) by using HDLC interframe flag stuffing.

Annex E

(normative)

Additional provisions for Recommendation Q.931

(This annex forms an integral part of this Recommendation)

E.1 General

The deviations (restrictions, additions, precisions) to Recommendation Q.931 apply only in the context of this Recommendation.

The following provisions apply throughout Recommendation Q.931:

- Information elements reserved in Recommendation Q.931 for national use may partly be already used by ETSI. Therefore the use should be avoided for other purposes.
- The information element or the message SEGMENT mentioned below is only required if the optional segmentation procedure defined in Annex K/Q.931 is implemented.
- The codeset 5 (see 4.5/Q.931) reserved for national use is already used by ETSI. Therefore the use should be avoided for other purposes.
- The codeset 6 (see 4.5/Q.931) was reserved originally for the local network and shall now be reserved for information elements specific to a national network (either public or private).

E.2 Subclause 2.1.2/Q.931: Network call states

This subclause refers to the call states at the network side of the interface.

E.3 Subclause 3.1/Q.931: Messages for circuit mode connection control

An additional message, SEGMENT (see Annex K/Q.931), is implemented.

The length for the “Call reference” element is 2-3 octets.

The “Display” element length is limited to the maximum length of 34 octets; its minimum length is 2 octets.

The following information elements are not supported:

- Signal;
- Feature activate;
- Feature indicate;
- Switchhook;
- Bearer capability;
- Repeat indicator.

E.4 Subclause 3.1.4/Q.931: CONNECT

An additional information element is implemented:

Information element	Reference	Direction	Type	Length
Date/Time	4.6	n → u	O (Note 12)	2-7
NOTE 12 – Included by the network, e.g. dependent on the telecommunication service requested by the user, or as a subscription option, or as a network provider default option.				

E.5 Subclause 3.1.8/Q.931: Information

Note concerning the keypad facility information element:

The use of the “Keypad facility” information element in the network-to-user direction to convey supplementary service information as part of the keypad facility procedures is a network option.

Note 6:

Only the “Called party number” information element is included by the user to convey called party number information to the network during overlap sending.

The phrase “if the user wants” in the second sentence of Note 6 does not apply.

Note 9:

Only the “Called party number” information element is included by the user to convey called party number information to the network during overlap sending.

E.6 Subclause 3.1.16/Q.931: Setup

Note concerning the “Keypad facility” information element:

The use of the “Keypad facility” information element in the network-to-user direction to convey supplementary service information as part of keypad invocation procedure is a network option.

Note 9 and Note 14:

Only the “Called party number” information element is included by the user to convey called party number information to the network.

E.7 Subclause 3.2/Q.931: Messages for packet-mode access connection control

Note concerning the information element “Progress indicator”:

It may be included in the event of interworking with private network. Public networks will ignore this information element.

The information element “Display” has a minimum length of 2 octets and a maximum length of 34 octets.

The information element “Channel identification” has a maximum length of 5 octets.

The information element “Call reference” has a maximum length of 3 octets.

The following information elements are not supported:

- user-user;
- information rate;
- end-to-end transition delay;
- transit delay selection and indication;
- packet layer binary parameters;
- packet layer window size;
- packet size.

The information elements “Called/Calling party number” each have a maximum length of 23 octets.

Note concerning the information elements “Calling party number/sub-address”:

Included in the user to network direction depending on the user/network identification requirements; included in the network-to-user direction if the network implements Recommendations X.25 and Q.931 information element mapping and provides indication to the called user of the calling sub-address.

Note concerning the information element “Progress indicator”:

It may be included in the event of interworking with a private network. Public networks will ignore this information element.

Note concerning the information element “Bearer capability”:

It is used to identify the ISDN packet mode bearer capability.

In addition, RESTART, RESTART ACKNOWLEDGE and STATUS messages usable with the global call reference shall apply when the restart procedures are used. These messages are defined in 3.4/Q.931.

E.8 Subclause 3.4/Q.931: Messages used with the global call reference

The message “SEGMENT” is included.

The information element “Display” has a maximum length of 34 octets.

The information element “Call reference” has a maximum length of 3 octets.

E.9 Subclause 4.3/Q.931: Call reference

The length of the call reference value for the basic access shall be 1 octet and for the primary rate access 2 octets.

The call reference flag also applies to functions which use the global call reference (e.g. restart procedures).

For the use of the global call reference value, see the restart procedure described in 5.5.

The dummy call reference shall not be used in association with the basic call. In this context, the second sentence of Note 1 does not apply.

E.10 Subclause 4.4/Q.931: Message type

When allocating codes for national message types, the following principle shall be applied for the first octet following the escape to nationally specific type:

1 0 x x x x x National standard,

1 x x x x x x ETSI standard.

E.11 Subclause 4.5/Q.931: Other information elements

The following information elements are not supported:

- Repeat indicator;
- Switchhook;
- Feature activation;
- Feature indication.

The maximum length of the “Display” information element is restricted to 34 octets.

The “Called/Calling party number” information element length is network dependent.

The following information elements may not be repeated:

- Bearer capability;
- Low layer compatibility;
- High layer compatibility.

E.12 Subclause 4.5.1/Q.931: Coding rules

NOTE – One of the single octet formats is specified for shift operations described in 4.5.2. This allows for the definition of eight codesets of 133 information element identifier values in each. Codeset 0 is used for these information elements that have been specified in this Recommendation. For codeset 5, see general remarks above.

E.13 Subclause 4.5.2/Q.931: Extension codesets

The information element identifier code points with bits 5 to 8 coded “0000” in each of the codesets are reserved for information elements for which comprehension by the receiver is required (see 5.8.7.1/Q.931 for specific error handling procedures).

E.14 Subclause 4.5.5/Q.931: Bearer capability

The following values are not applicable in ISDNs conforming to this ETS:

- Information transfer capability (octet 3):
“restricted digital information”.
- Structure (octet 4a):
transfer mode: circuit
transfer capability: restricted digital
structure: 8 kHz integrity.
- User information layer 1 protocol (octet 5):
Recommendation G.711 μ -law
CCITT standardized rate adaption V.120.
- Octet 5b for V.120 rate adaption.

E.15 Subclause 4.5.6/Q.931: Call identity

The maximum length of this information element is always 10 octets.

E.16 Subclause 4.5.7/Q.931: Call state

The purpose of the “Call state” information element is not to describe an access connection.

E.17 Subclause 4.5.8/Q.931: Called party number

The maximum length of this information element is 23 octets.

Note concerning the information element “Abbreviated number”:

NOTE – The support of this code is network dependent. The number provided in this information element presents a shorthand representation of the complete number in the specified numbering plan as supported by the network.

E.18 Subclause 4.5.9/Q.931: Called party sub-address

NOTE – When the initial domain identifier (IDI) format is “local”, the AFI field is coded “50” in BCD. IA5/ISO646 character syntax DSP is then represented by converting each character to a number in the range 32-127 using the T.50/ISO646 encoding, with zero parity and the parity bit in the most significant position, yielding a binary octet in the range 0010 0000-0111 1111.

NOTE – It is recommended that users apply the local IDI format when the sub-address is used for terminal selection purposes. In this case the IA5 character syntax using only digits 0 to 9 shall be used for the DSP.

E.19 Subclause 4.5.10/Q.931: Calling party number

The information element “Abbreviated number” is not applicable.

The “Screening indicator”: “user-provided, verified and failed” is not applicable.

E.20 Subclause 4.5.11/Q.931: Calling party sub-address

The additional Notes in E.18 apply.

E.21 Subclause 4.5.13/Q.931: Channel identification

The following codepoints or values are not applicable in ISDNs conforming to this ETS:

- “Interface identifier present”:
interface explicitly defined;
- “Interface identifier”;
- “Number/map”:
channel is indicated by the slot map;
- “Slot map”.

The use of the following codepoints is restricted in ISDNs conforming to this ETS:

- “Interface type”: This codepoint is only applied for the primary rate interface.
- “Channel number”: Channel number is used exclusively.

E.22 Subclause 4.5.15/Q.931: Display

The display information element has a maximum length of 34 octets.

The IA5 character string in the “Display” field shall be coded using appropriate national IA5 tables.

E.23 Subclause 4.5.16/Q.931: High layer compatibility

These information elements are coded as below in ISDNs conforming to this ETS:

High layer characteristics identification (octet 4):

Bits

7654321

0000001 Telephony

0000100 Facsimile Group 2/3 (Recommendation F.182)

0100001 Facsimile Group 4, class I (Recommendation F.184)

0100100 Teletex service, basic and mixed mode of operation (Recommendation F.230) and facsimile service Group 4, classes II and III (Recommendation F.184)

0101000 Teletex service, basic and processable mode of operation (Recommendation F.220)

0110001 Teletex service, basic mode of operation (Recommendation F.200)

0110010 International interworking for Videotex services (Recommendations F.300 and T.101)

0110101 Teletex service (Recommendation F.60)

Extended high layer characteristics identification (octet 4a):

Bits

7654321

0000001 Telephony

0000100 Facsimile Group 2/3 (Recommendation F.182)

0100001 Facsimile Group 4, class I (Recommendation F.184)

0100100 Teletex service, basic and mixed mode of operation (Recommendation F.230) and facsimile service Group 4, classes II and III (Recommendation F.184)

0101000 Teletex service, basic and processable mode of operation (Recommendation F.220)

0110001 Teletex service, basic mode of operation (Recommendation F.200)

0110010 International interworking for Videotex services (Recommendation F.300 and T.101)

0110101 Teletex service (Recommendation F.60)

E.24 Subclause 4.5.18/Q.931: Low layer compatibility

The octet 3a shall be present if out-band negotiation is required.

The “Modem type” information element is coded as below for ISDNs conforming to this Recommendation:

Modem type (octet 5d):

Bits

654321

000000 Reserved

000001 V.21

000010 V.22

000011 V.22 *bis*

000100 V.23

000101 V.26

000111 V.26 *bis*

001000 V.26 *ter*

001001 V.27

001010 V.27 *bis*

001011 V.27 *ter*

001100 V.32

001101 V.35

100000	}	Reserved for national use.
through		
111111		

All other values are reserved.

The following information elements are user specified:

- Optional layer 2 protocol information (octet 6a);
- Optional layer 3 protocol information (octet 7a).

E.25 Subclause 4.5.21/Q.931: Notification indicator

The notification description information element “Bearer service change” is not applicable.

E.26 Subclause 4.5.23/Q.931: Repeat indicator

This information element is not used.

E.27 Subclause 4.5.24/Q.931: Restart indicator

Since this Recommendation applies only to associated signalling, the “Channel identification” information element shall not be included to indicate the interface to be restarted. As a consequence, either code point can be used to perform the same function.

E.28 Subclause 4.7.6/Q.931: Redirecting number

The maximum length of this information element is network dependent. However it shall not exceed 25 octets.

“Type of Number” (octet 3): “abbreviated number” is not applicable.

“Screen indicator” (octet 3a): “user provided, verified and failed” is not applicable.

E.29 Subclause 5.1.1/Q.931: Call request

The dummy call reference value is not supported in association with the basic call.

In the case of *en-bloc* sending, item b) does not apply.

If *en-bloc* sending is used, the SETUP message may contain the sending complete indication (i.e. either the “Sending complete” information element or the “#” character within the “Called party number” information element). It is mandatory for the network to recognize the “Sending complete” information element.

Called party sub-address information, if present, shall be given in the “Called party sub-address” information element and, in the case of overlap sending, shall only be sent in the SETUP message.

E.30 Subclause 5.1.2/Q.931: B-channel selection – Originating

It is recommended that TEs connected to the ISDN basic access should use alternative c) for basic circuit-switched call control unless the TE is already using a given B-channel.

The selected B-channel is indicated in the “Channel identification” information element coded as “channel is indicated, no acceptable alternative”.

E.31 Subclause 5.1.8/Q.931: Call connected

Upon receiving an indication that the call has been accepted, the network shall remove any applied ringing tone.

E.32 Subclause 5.2/Q.931: Call establishment at the destination interface

The second paragraph shall read:

Data link connections may be established by the TA, TE or NT2 as soon as a TEI is assigned (either locally or by automatic assignment procedure), and may be retained indefinitely. This may be recommended as a network option.

E.33 Subclause 5.2.1/Q.931: Incoming call

The knowledge that a single-point configuration exists may be based on information entered at the time of configuration of the access.

For procedures to be followed on expiry of timer T312, see also 5.2.5.3/Q.931 (Case 1).

E.34 Subclause 5.2.3.1/Q.931: SETUP message delivered by point-to-point data link

Item a):

All ISDNs conforming to this Recommendation will support the “no B-channels available” condition.

Item b):

In Case 2) the channel is identified in the Channel identification information element as “channel is indicated, no acceptable alternative”.

Item e):

See 5.2.4/Q.931 and 5.2.5/Q.931 for the appropriate first response to the SETUP message.

E.35 Subclause 5.2.6/Q.931: Notification of interworking at the terminating interface

If the “Progress indicator” information element is included in the PROGRESS message, it is assumed that ISDNs will stop any supervisory timer except network timers T304 and T312.

E.36 Subclause 5.2.4/Q.931: Overlap receiving

If a “sending complete” indication is provided, the “Sending complete” information element shall be used.

E.37 Subclause 5.2.7/Q.931: Call accept

The Note does not apply.

E.38 Subclause 5.3.3/Q.931: Clearing initiated by the user

The actions to be taken with regard to the maintenance condition are network dependent.

E.39 Subclause 5.3.4.3/Q.931: Completion of clearing

The option of placing the B-channel in the maintenance condition is not applicable in the case of point-to-multipoint configurations.

E.40 Subclause 5.3.5/Q.931: Clear collision

“Call reference value” shall be replaced by “Call”.

In the last sentence, “if appropriate” shall be removed.

E.41 Subclause 5.5/Q.931: Restart procedure

The restart procedure may also be initiated as a result of local failure, maintenance action or misoperation.

E.42 Subclause 5.5.1/Q.931: Sending RESTART

Also, no further RESTART messages shall be sent until a RESTART ACKNOWLEDGE message is received or timer T316 expires.

If a RESTART ACKNOWLEDGE message is received indicating only a subset of the specified channels, an indication shall be given to the maintenance entity to determine what actions shall be taken on the channel(s) which have not been returning to the idle condition.

E.43 Subclause 5.5.2/Q.931: Receipt of RESTART

Note 2 (changed) – The receiving entity shall return to the Null state only those Q.931 calls which are:

- a) associated with the data link connection endpoint identifier (DLCI; see Recommendation Q.920); and
- b) which correspond to the specified channel(s) or interface.

If only a subset of the specified channels have been returned to the idle condition when timer T317 expires, a RESTART ACKNOWLEDGE message should be transmitted to the originator, containing a “Channel identification” information element indicating the channel(s) that have been returned to the idle condition.

The following entities shall be released:

- a) B-channels established by Q.931 messages including channels used for packet access (Case B) (consequently all virtual calls carried in the released channel(s) will be handled as described in 6.4.1);
- b) user signalling bearer service connections.

The following entities shall not be released:

- a) semi-permanent connections that are established by man-machine commands;
- b) entities associated with any other DLCI.

If semi-permanent connections established by man-machine commands are implicitly specified (by specifying “single interface” or “all interfaces”), no action shall be taken on those channels but a RESTART ACKNOWLEDGE message shall be returned containing the appropriate indications (i.e. “single interface” or “all interface”).

If semi-permanent connections established by man-machine commands are explicitly specified (by including a “Channel identification” information element in the RESTART message), no action shall be taken on those channels and a STATUS message shall be returned with cause #82 “identification channel does not exist” optionally indicating in the diagnostic field the channel(s) that could not be handled.

E.44 Subclause 5.6/Q.931: Call rearrangements

The use of the call rearrangement procedure is restricted to basic access, i.e. it will not be available for primary rate access. For call rearrangements controlled by an NT2, see 5.6.7/Q.931.

E.45 Subclauses 5.6.1/Q.931 and 5.6.2/Q.931: Call suspension/suspended

Some networks may only support a maximum length of the call identity value of two octets.

E.46 Subclause 5.6.3/Q.931: Call suspend error

If the network does not support the call rearrangement procedures, it shall reject a SUSPEND message according to the error handling procedures of 5.8.4/Q.931. If the network supports the call rearrangement procedures on a subscription basis, but the user does not subscribe to the service, the network shall reject a SUSPEND message by sending a SUSPEND REJECT message with cause #50 “request facility not subscribed”; the “Cause” information element shall not contain a diagnostic field under these circumstances.

E.47 Subclause 5.6.4/Q.931: Call re-establishment

Some networks may not support the use of the NOTIFY message.

No compatibility checking is performed during the call re-establishment phase.

E.48 Subclause 5.6.5/Q.931: Call resume errors

If the network does not support the call rearrangement procedures, it may reject a RESUME message according to the error handling procedures of 5.8.3.2 a)/Q.931. For this purpose, the RESUME message would be deemed to be an unrecognized message.

E.49 Subclause 5.8.3.1/Q.931: Invalid call reference format

When a message associated with the basic call is received specifying the dummy call reference, this message shall be ignored.

E.50 Subclause 5.8.3.2/Q.931: Call reference procedural errors

Item a):

RESUME applies in this context for networks supporting the call rearrangement procedures of 5.6/Q.931.

E.51 Subclause 5.8.5/Q.931: General information element errors

The use of the locking or non-locking shift procedures in the diagnostic field of the “Cause” information element only applies to the interpretation of the information element identifiers of the information elements in codesets other than 0 without any impact on the interpretation of the information element itself.

E.52 Subclause 5.8.7.2/Q.931: Non-mandatory information element content error

The “Call identity” information element will have a special treatment and will be truncated and processed in the case that it exceeds the maximum length implemented.

E.53 Subclause 5.8.9/Q.931: Data link failure

This clause should read as follows:

Whenever a Q.931 entity is notified by its data link entity via the DL-RELEASE-INDICATION primitive that there is a data link layer malfunction, the following procedure shall apply:

- a) Any calls not in the Active states shall be cleared internally.
- b) For any call in the Active state, timer T309 shall be started (if implemented).

If timer T309 is already running, it shall not be restarted.

The Q.931 entity shall request layer 2 re-establishment by sending a DL-ESTABLISH-REQUEST primitive.

When informed of layer 2 re-establishment by means of the DL-ESTABLISH-CONFIRM primitive, the following procedure shall apply:

- 1) stop timer T309;
- 2) a STATUS message with cause #31, "normal, unspecified" shall also be sent to report the current call state to the peer entity. Alternatively, a STATUS ENQUIRY message may be sent to verify the call state of the peer entity.

If timer T309 expires prior to data link re-establishment, the network shall clear the network connection and call to the remote user with cause #27 "destination out of order", disconnect and release the B-channel, release the call reference and enter the Null state.

If timer T309 expires prior to data link re-establishment, the user shall clear an attached connection (if any) with cause #27 "destination out of order", disconnect and release the B-channel, release the call reference and enter the Null state.

The implementation of timer T309 in the user side is optional, and in the network side is mandatory.

E.54 Subclause 5.8.10/Q.931: Status enquiry procedure

Cause #30 shall be used when the status enquiry procedure is implemented.

E.55 Annex B/Q.931: Compatibility checking

"DDI" shall be removed.

"DDI number" shall be replaced by "assigned number".

B.3.4/Q.931: User action tables

"DDI" shall be replaced by "the appropriate part of the called party number".

Annex F (normative)

Information elements for the control of packet-mode access connections (This annex forms an integral part of this Recommendation)

This annex lists the information elements used by packet-mode access connections control procedures.

F.1 Protocol discriminator

Coded as specified by 4.2/Q.931 (see Figure 4.2/Q.931).

F.2 Call reference

The Call reference information element is managed and coded as defined by 4.3/Q.931.

It is two octets long on the basic rate access and three octets long on the primary access.

The Dummy call reference value shall not be used.

The Global Call reference value is applicable only when the Restart procedure is used (see 5.5/Q.931).

F.3 Message type

This information element is coded as defined by 4.4/Q.931. Table F.1 shows the coding of the message types applicable to the packet-mode access connections control procedures.

TABLE F.1/T.103

Message types

8	7	6	5	4	3	2	1	
0	0	0	0	0	0	0	0	Escape to nationally specific message type (Notes 1 and 2)
0	0	0	-	-	-	-	-	Access connection establishment messages:
	0	0	0	0	1			– ALERTING
	0	0	0	1	0			– CALL PROCEEDING
	0	0	1	1	1			– CONNECT
	0	1	1	1	1			– CONNECT ACKNOWLEDGE
	0	0	0	1	1			– PROGRESS
	0	0	1	0	1			– SETUP
0	1	0	-	-	-	-	-	Access connection clearing messages:
	0	0	1	0	1			– DISCONNECT
	0	1	1	0	1			– RELEASE
	1	1	0	1	0			– RELEASE COMPLETE
	0	0	1	1	0			– RESTART
	0	1	1	1	0			– RESTART ACKNOWLEDGE
0	1	1	-	-	-	-	-	Miscellaneous messages:
	1	1	1	0	1			– STATUS
	1	0	1	0	1			– STATUS ENQUIRY
NOTES								
1 When used, the message type is defined in the following octet(s), according to the national specification.								
2 When allocating codes for national message types, the following principle shall be applied for the first following octet:								
1 0 X X X X X X: National standard								
1 1 X X X X X X: ETSI standard.								

F.4 Other information elements

The list of the information elements and the coding of the information element identifiers of codeset 0 and specific to each message are shown in Table F.2.

TABLE F.2/T.103
Information element identifier coding

	Q.931 (references)	Maximum length (octets)
8 7 6 5 4 3 2 1 1 : : : - - - - Single octet information elements: 0 0 0 - - - - Reserved 0 0 1 - - - - Shift (Note) 0 : : : : : : : Variable length information elements: 0 0 0 0 1 0 Bearer capability 0 Cause 0 0 0 1 0 0 0 Call state 0 0 1 0 1 0 0 Channel identification 0 0 1 1 1 1 Progress indicator 0 1 1 0 1 1 0 Calling party number 0 1 1 0 1 1 0 Calling party sub-address 1 1 1 1 0 0 0 Called party number 0 1 1 1 0 0 0 Called party sub-address 1 1 1 1 0 1 0 Redirecting number 0 1 1 1 1 0 0 Restart indicator 1 1 1 1 1 1 1 Escape for extension 1 All other values are reserved.	 4.5.3/4.5.4 4.5.5 4.5.12 4.5.7 4.5.13 4.5.22 4.5.10 4.5.11 4.5.8 4.5.9 F.6 4.5.24	 1 7 32 3 5 4 24 23 23 23 25 3
NOTE – This information element may appear more than once in a message.		

Their coding rules are specified in 4.5.1/Q.931, the use of other codesets than codeset zero is defined in 4.5.2, and procedures for changing from one codeset to another are defined in 4.5.3 and 4.5.4.

The codings of the information elements listed in Table F.2 are defined in Recommendation Q.931, as shown in the reference column, with the exception of the coding of the Redirecting number information element which is specified in F.6.

NOTES

- 1 The Bearer capability is coded with the attribute values defined in 6.1.2.1/X.31. It shall be 7 octets long.
- 2 The Cause information element shall only contain values defined in Table 4.13/Q.931. Octet 3a shall therefore not be used. If present, the Cause information element shall be treated according to error handling procedures defined in 5.8/Q.931.

F.6 Redirecting number

The purpose of the redirecting number information element is to identify the number from which a call diversion or transfer was invoked.

The redirecting number information element is coded as shown in Figure F.1 and Table F.3.

The maximum length of this information element is network dependent. However, it shall not exceed 25 octets.

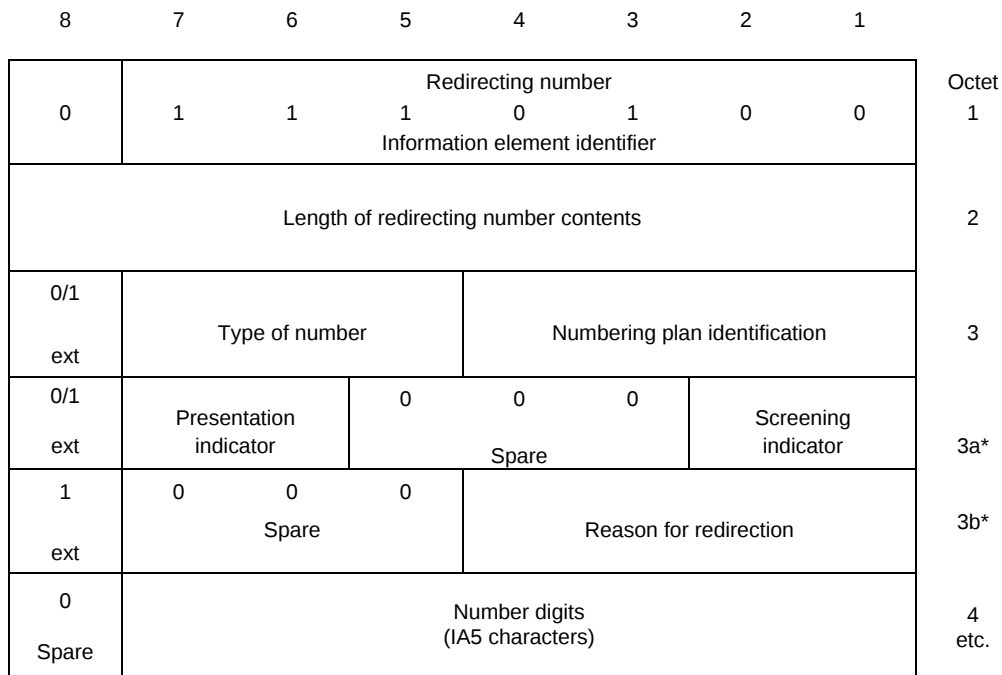


FIGURE F.1/T.103
Redirecting number information element

TABLE F.3/T.103
Redirecting number information element

Type of number (octet 3) (Note 1)	
Bits	
7 6 5	
0 0 0	Unknown (Note 2)
0 0 1	International number (Note 3)
0 1 0	National number (Note 3)
0 1 1	Network specific number (Note 4)
1 0 0	Subscriber number (Note 3)
1 1 0	Abbreviated number (Note 5)
1 1 1	Reserved for extension
All other values are reserved. NOTES 1 For the definition of international, national and subscriber number, see Recommendation I.330 [5]. 2 The type of number “unknown” is used when the user or the network has no knowledge of the type of number, e.g. international number, national number, etc. In this case the number digits field is organized according to the network dialling plan; e.g. prefix or escape digits might be present. 3 Prefix or escape digits shall not be included. 4 The type of number “network specific number” is used to indicate administration/service number specific to the serving network, e.g. used to access an operator. 5 This codepoint is not applicable to this Recommendation.	

TABLE F.3/T.103 (cont.)

Redirecting number information element

Numbering plan identification (octet 3)	
Bits 4 3 2 1	
0 0 0 0	Unknown (Note)
0 0 0 1	ISDN/telephony numbering plan (Recommendations E.164 [2] and E.163 [1])
0 0 1 1	Data numbering plan (Recommendation X.121)
0 1 0 0	Telex numbering plan (Recommendation F.69)
1 0 0 0	National standard numbering plan
1 0 0 1	Private numbering plan
1 1 1 1	Reserved for extension
Numbering plan (applies for type of number = 000, 001, 010 and 100). All other values are reserved. NOTE – The numbering plan “unknown” is used when the user or the network has no knowledge of the numbering plan. In this case the number digits field is organized according to the network dialling plan, e.g. prefix or escape digits might be present.	

Presentation indicator (octet 3a)	
Bits 7 6	
0 0	Presentation allowed
0 1	Presentation restricted
All other values are reserved. NOTE – At the redirecting user-network interface, the presentation indicator is used for indicating the intention of the redirecting user for the presentation of the redirecting number to the called user. This may also be requested on a subscription basis. If octet 3a is omitted, and the network does not support subscription information for the redirecting number information restrictions, the value “00 presentation allowed” is assumed.	

Screening indicator (octet 3a)	
Bits 2 1	
0 0	User provided, not screened
0 1	User provided, verified and passed
1 0	User provided, verified and failed
1 1	Network provided
NOTE – If octet 3a is omitted “00 User provided, not screened” is assumed.	

TABLE F.3/T.103 (*end*)
Redirecting number information element

Reason for redirection (octet 3b)	
Bits 4 3 2 1	
0 0 0 1	Call forwarding busy or called DTE busy
0 0 1 0	Called forwarding no reply
1 0 0 1	Called DTE out of order
1 0 1 0	Call forwarding by the called DTE
1 1 1 1	Call forwarding unconditional or systematic call redirection
All other values are reserved.	

Number digit (octet 4, etc.)
This field is coded with IA5 characters, according to the formats specified in the appropriate numbering/ dialling plan.

Annex G

(informative)

References

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

- CCITT Rec. I.112 (1988) *Vocabulary of terms for ISDN*.
- CCITT Rec. T. 51 (1988) *Coded character sets for telematic services*.
- CCITT Rec. T. 90 *Characteristics and protocols for terminals for telematic services in ISDN*.
- CCITT Rec. X.29 *Procedures for the exchange of control information and user data between a packet assembly/disassembly (PAD) facility and a packet mode DTE or another PAD*.
- CCITT Rec. X.75 (1984) *Packet-switched signalling system between public networks providing data transmission services*.
- ISO 8348 *Information processing systems – Data communications – Network service definition*.
- ISO/IEC 8878 *Information processing systems – Data communications – Use of X.25 to provide the OSI connection-mode network service*.
- ISO/IEC TR 9574 *Information technology – Telecommunications and information exchange between systems – Provisions of the OSI connection-mode network service by packet mode terminal equipment connected to an integrated services digital network (ISDN)*.