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TECHNICAL SPECIFICATION FOR CONNECTING TO THE INTEGRATED SERVICES DIGITAL NETWORK (ISDN) USING PRIMARY RATE ACCESS

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FOREWORD

This Technical Specification was developed under the authority of the Malaysian Communications and Multimedia Commission (SKMM) under the Communications and Multimedia Act 1998 (CMA 98) and the relevant provisions on technical regulation of Part VII of the CMA 98. It is based on recognised International Standards documents.

This Technical Specification specifies the specifications to conform for approval telecommunications devices.

NOTICE

This Specification is subject to review and revision

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INTERGRATED SERVICES DIGITAL NETWORK (ISDN) USING PRIMARY RATE ACCESS

Section A. Introduction

1. Scope

1.1 This Specification identifies the minimum technical requirements for connecting to the Integrated Services Digital Network (ISDN) at the T interface, using Primary Rate Access (PRA).

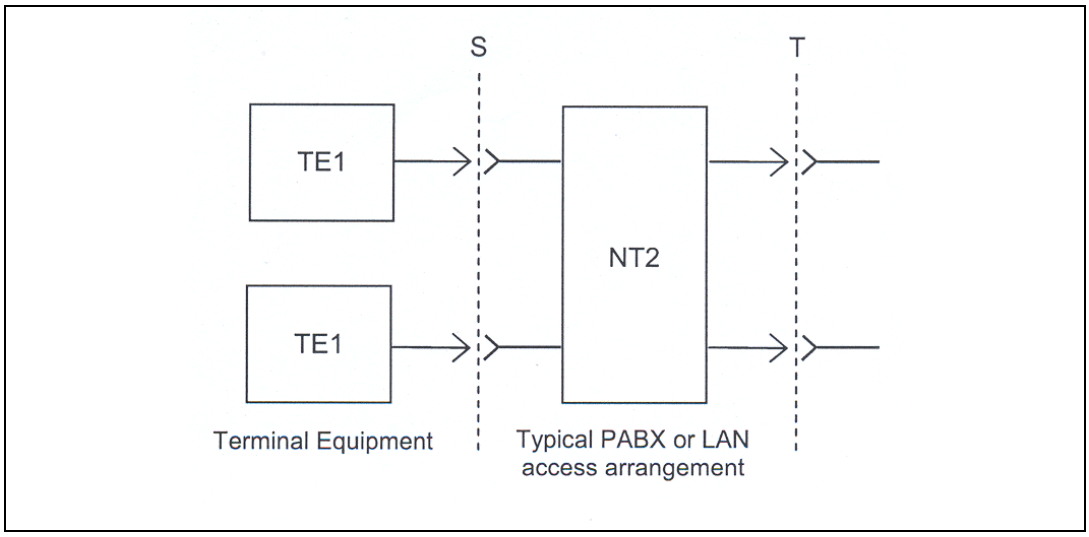

Figure 1. Reference Configuration for Multiple Connections (Figure 1/I.412)

1.2 The ISDN PRA equipment connected to the T interface (see Figure 1) shall have the Network Termination 2 (NT2) function. Suppliers shall demonstrate that the equipment has been tested to comply with the requirements defined in Section A, B, C and D of this Specification.

Part B	–	Physical layer requirements based on ITU-T Rec. I.431, Primary Rate User-Network Interface – Layer 1 Specification
Part C	–	Link Access Procedure on the D-channel, LAPD based on ITU-T Rec. Q.921, ISDN User-Network Interface – Data Link Layer Specification
Part D	–	Network layer requirements based on ITU-T Rec. Q.931, ISDN User-Network Interface Layer 3 Specification for Basic Call Control

1.3 Notations used in the Specification

The use of the term Terminal Equipment (TE) within the Specification refers to a Terminal Equipment Type 1 (TE1), a Terminal Adaptor (TA) or a NT2.

The following notations are used in the Specification:

CR — Conformance Requirement defines features and functions that must be supported at minimum.

M — Mandatory requirement is where the TE implementation shall conform to those clauses in that section relating to the operation of Layer 1, Layer 2 and Layer 3 protocol in the TE.

O — Optional requirement means it is optional whether TE implements that function but if function is implemented, it shall conform to the clauses in that section relating to the operation of the TE Layer 1, Layer 2 and Layer 3 protocol.

However, the use of optional functions is possible only if the network operators have implemented these options in their networks.

NA — Not Applicable is where the requirements specified in that section on the TE shall not be applicable for attachment.

GID — The section provides General Information and Definitions.

2. General requirements

2.1 Design of Equipment

CR

Power supply	A.C. mains supply of 230 V ± 10%, 50 Hz ± 2%	Note 1
	External A.C. adapter	Note 1
Identification of equipment	Equipment shall be marked with:	M
	a) supplier's or manufacturer's name or identification mark	
	b) supplier's or manufacturer's model or type reference	M
	The markings shall be legible, indelible and readily visible	M
Keypad Dialling	a) Keypads used in equipment for dialling shall be alphanumeric keypads and the relationships between the letters and the digits shall comply with ITU-T Rec E.161 as shown in figure 1.	M
	b) The associated letters must not impair the legibility of the digit (§ 3.1.1, ITU-T Rec. E.161).	M
	c) The tactile identifier on the "5" button shall be provided (§ 3.6, ITU-T Rec. E.161).	M

2.2 Analogue Interface

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When provided, the equipment has the TA function for connecting analogue equipment at the R interface as shown Figure 2.

Connector	2 wire, 6 pin modular RJ 11 jack	Note 2
Feed voltage	$\leq$ 40 V d.c.	Note 2
Line extension	Interworking with loop resistance up to 500 Ω	Note 2
MFPB receiver	a) Level range: 0 dBm to −26 dBm	Note 2
	b) Signal detection: min 40 ms	Note 2
	c) Interdigit pause : min 40 ms	Note 2
	d) Frequency deviation: ± 1.8%	Note 2

Ringing current transmit	a) Frequency: 24 Hz	Note 2
	b) Periodicity for normal ringing: 0.4 s (on), 0.2 s (off), 0.4 s (on), 2.0 s (off)	Note 2
	c) Periodicity for duplex/distinctive ringing: 1.2 s (on), 3.0 s (off)	Note 2
	d) Voltage: ≤ 75 V	Note 2
Dial tone transmit	425 Hz continuous tone	Note 2
Busy tone transmit	a) 425 Hz	Note 2
	b) Periodicity: 0.75 s (on), 0.75 s (off)	Note 2
Output level	Analogue output signal level shall not exceed −6 dBm averaged over any 10 s period	Note 2
A/D/A companding	Digital telephones and other customer equipment providing acoustic interfaces to the digital bit stream shall comply with ITU-T G.711 (A law).	Note 2

2.3 Characteristics of Telephone –

SLR	In the range 5 dBm to 11 dB	Note 3
RLR	In the range −1 dBm to 5 dB	Note 3
STMR	In the range 10 dBm to 15 dB	Note 3

NOTES:

1. Either one of these options must be applied.
2. Requirement is 'NA' if TE does not have TA function for connecting analogue equipment to the R interface. If applicable, equipment shall be tested.
3. Requirement is 'NA' if TE does not have telephone handset function. If applicable, equipment shall be tested.

1	**2** **ABC**	**3** **DEF**
4 **GHI**	**5** **JKL**	**6** **MNO**
7 **PQRS**	**8** **TUV**	**9** **WXYZ**
*****	**0**	**#**

Figure 2. Alphanumeric Keypad Layout (ITU-T Rec. E. 161)

3. Electromagnectic Compatibility & Electrical Safety Requirements

3.1 The equipment shall comply with the limits for conducted disturbance at the mains terminals and telecommunication ports, and the limits for radiated disturbance defined in the IEC CISPR 22.

3.2 The equipment shall comply with the IEC 60950-1 safety standard[1]. The requirements in IEC 60950-1 that are applicable to the equipment [e.g. class of equipment, type of telecommunication network voltage (TNV) circuit and types of components shall be identified and complied with.

[1] The safety standard includes, among others, protection of telecommunications network service personnel and users of other equipment connected to the network from hazards in the equipment.

Section B. Primary Rate User-Network Interface – Layer 1 Specification (ITU-T Recommendation I.431 03/1993 & Amendment 1 06/1997)

Title	ITU-T Rec. I.431	ETSI TBR 4	CR	Remarks
Introduction	1	-	GID	Supports user-network interface at 2048 kbit/s
Type of configuration	2	–	M	Primary rate access at the T reference point shall support the point-to-point configuration only. Electrical characteristics are defined in ITU-T Rec. G.703.
Functional characteristics	3	–	M	Heading
Summary of functions (Layer 1)	3.1	–	M	– B-channel (64 kbit/s)
			O	– H0-channel
			O	– H1-channel
			M	– D-channel (64 kbit/s)
			M	– Bit timing
			M	– Octet timing
			M	– Frame alignment
			O	– Power feeding
			M	– Maintenance
			M	– CRC procedure
Interchange circuits	3.2	–	M	Two interchange circuits, one for each direction, are used for the transmission of digital signals
Activation/deactivation	3.3	–	M	Active at all times
Operational functions	3.4	–	M	Heading
Definitions of signals at the interface	3.4.1	9.5.1	GID	
Definitions of state tables at network and user sides	3.4.2	–	GID	
Layer 1 states on the user side of the interface	3.4.3	9.5.2	M	
Layer 1 states at the network side of the interface	3.4.4	–	NA	Network side
Definition of primitives	3.4.5	–	M	
State tables	3.4.6	9.5.3	M	Table 2/I.431 is applicable
Interface at 1544 kbit/s	~~4~~	–	NA	

Title	ITU-T Rec. I.431	ETSITB R 4	CR	Remarks
Interface at 2048 kbit/s	5	–	–	Heading
Electrical characteristics	5.1	9.2 9.3	M	a) 120 Ω symmetrical pair interface b) ITU-T Rec. G.703 section 6
Frame structure	5.2	9.4	M	Note 1
Timing considerations	5.3		M	
Jitter	5.4	9.3.3	M	
Tolerable longitudinal voltage	5.5	9.3.4	M	
Output signal balance	5.6	–	M	f=1 MHz; ≥ 40 dB 1 MHz < f ≤ 30 MHz; decreasing from 40 dB at 20 dB/decade
Impedance towards ground	5.7	9.2.2 9.3.5	M	10 Hz < f ≤ 1 MHz; > 1000 Ω
Interface procedures	5.8	9.5.5	M	
Maintenance at the interface	5.9	9.5.4	M	On the user side
Connector	6	–	M	ISO/IEC standards and permanent wiring are permitted
Interface wiring impedance	7	–	M	120 Ω ± 20%, 200 kHz - 1 MHz 120 Ω ± 10%, 1 MHz Two symmetrical pair connections shall be provided. No power feeding is available in either direction.
Power feeding to the NT	8	–	O	Provision of power using a separate pair of wires, is optional.
Timeslot assignment for interfaces having only H0 channels	Annex A	–	Note 2	
Timeslot assignment for 2048 kbits/s interface having H11 channel	Annex B	–	Note 3	

NOTES:

1. H-channels may not be supported depending on local implementation.
2. 'M' if H0 channels are supported.
3. 'M' if H11 channels are supported.
4. The use of optional functions is possible only if the network operators have implemented these options in their networks.

Section C. ISDN User-Network Interface – Data Link Layer (ITU-T Recommendation Q.921 09/1997 & Amendment 1 06/2000)

Table 1. Frame structure for peer-to-peer communication

Title	ITU-T Rec. Q.921	ETSI TBR 4	CR	Remarks
General	1	–	GID	
Frame structure for peer-to-peer communication	2	10.1	GID	Heading
General	2.1	10.1.1	M	
Flag sequence	2.2	10.1.2	M	
Address field	2.3	10.1.3	M	
Control field	2.4	10.1.4	M	
Information field	2.5	10.1.5	M	
Transparency	2.6	10.1.6	M	
FCS field	2.7	10.1.7	M	
Format convention	2.8	10.1.8	–	
Invalid frames	2.9	10.1.9 Note	M	
Frame abort	2.10	–	M	Not a TBR 4 requirement
NOTE. TBR 4 includes a frame, which contains a TEI that is not assigned to the TE as invalid.				

Table 2. Elements of procedure and formats of field for data link layer peer-to-peer communication

Title	ITU-T Rec. Q.921	ETSI TBR 4	CR	Remarks
Elements of procedure and formats of field for data link layer peer-to-peer communication	3	10.2	–	Heading
General	3.1	10.2.1	GID	
Address field format	3.2	10.2.2	M	
Address field variables	3.3	10.2.3	–	Note 1
Control field formats	3.4	10.2.4	M	
Control field parameters and associated state variables	3.5	10.2.5	M	
Poll/Final (P/F) bit	3.5.1	10.2.5.1	M	
Multiple frame operation – variables and sequence numbers	3.5.2	10.2.5.2	M	

Table 2. Elements of procedure and formats of field for data link layer peer-to-peer communication *(continued)*

Title	ITU-T Rec. Q.921	ETSI TBR 4	CR	Remarks
Unacknowledged operation – variables and parameters	3.5.3		GID	One parameter is defined, N201 (see 5.9.3).
Frame types	3.6	10.2.6	–	Heading
Commands and responses	3.6.1	10.2.6.1 Note 3	M	Refer to Table 5/Q.921
Information (I) command	3.6.2	10.2.6.2	M	
Set Asynchronous Balanced Mode Extended (SABME) command	3.6.3	10.2.6.3	M	
Disconnect (DISC) command	3.6.4	10.2.6.4	M	
Unnumbered Information (UI) command	3.6.5	10.2.6.5	M	
Receive Ready (RR) command/response	3.6.6	10.2.6.6	M	
Reject (REJ) command/response	3.6.7	10.2.6.7	M	
Receive Not Ready (RNR) command/response	3.6.8	10.2.6.8	M	
Unnumbered Acknowledgement (UA) response	3.6.9	10.2.6.9	M	
Disconnected Mode (DM) response	3.6.10	10.2.6.10	M	
Frame Reject (FRMR) response	3.6.11	–	M	Note 2
Exchange Identification (XID) command/response	3.6.12	–	NA	Note 2
NOTES: 1. Value '0' is allocated to TEI. Other values are not used in PRA. 2. TBR 4 does not support FRMR response and XID command/response.				

Table 3. Elements for layer-to-layer communication

Title	ITU-T Rec. Q.921	ETSI TBR 4	CR	Remarks
Elements for layer-to-layer communication	4	–	GID	

Table 4. Procedures for use by the data link layer

Title	ITU-T Rec. Q.921	ETSI TBR 4	CR	Remarks
Definition of peer-to-peer procedures for the data link layer	5	–	GID	
Procedures for the use of P/F bit	5.1	–	–	Heading
Unacknowledged information transfer	5.1.1	10.4.1	M	NA to PRA
Acknowledged multiple frame information transfer	5.1.2	10.6 and 10.7	M	
Procedure for unacknowledged information transfer	5.2	10.4	–	NA to PRA
TEI management procedures	5.3	10.5	–	NA to PRA
Initialisation of data link layer parameters	5.4	–	NA	Note 1
Procedure for establishment and release of multiple frame operation	5.5	10.6	–	
Procedure for information transfer in multiple frame operation	5.6	10.7	GID	
Re-establishment of multiple frame operation	5.7	–	–	
Exception condition reporting and recovery	5.8	10.9 Note 2	GID	Multiple TEI assignment is not applicable.
List of system parameters	5.9	10.10	M	
Timer T200	5.9.1	10.10.1	M	The default value shall be 1 s.
Max number of retransmissions (N200)	5.9.2	10.10.2	M	The default value shall be 3.
Max number of octets in an information field (N201)	5.9.3	10.10.3	M	The default value shall be 260 octets.
Max number of transmission of the TEI identity request message (N202)	5.9.4	10.10.4	M	NA to PRA
Max number of outstanding I frames (k)	5.9.5	10.10.5	M	For a SAP supporting primary rate signalling, the value is 7.
Timer T201	5.9.6	–	NA	NA to PRA
Timer T202	5.9.7	10.10.6	M	NA to PRA
Timer T203	5.9.8	–	O	The default value is 10 s.
–	–	10.10.7 Note 3	GID	Layer 2 response time
Data link monitor function	5.10	–	O	

NOTES:

1. The data link layer parameters shall be initialised to default values.
2. TBR 4 considers the receipt of an invalid N(R) as the only condition for frame rejection.
3. The maximum time between receipt of an incoming frame and generation of a response shall not exceed 500 ms, operating in a point-to-point signalling connection.

Table 5. Annexes and Appendices

Title	ITU-T Rec. Q.921	ETSI TBR 4	CR	Remarks
Provision for point-to-point data link connection	Annex A	10.3	M	For single point-to-point signalling connection at layer 3, TEI value 0 shall be used in combination with SAPI 0.
An SDL representation of the point-to-point procedures of data link layer	Annex B	–	–	
SDL representation of the broadcast procedures of the data link layer	Annex C	–	GID	
State transition table of the point-to-point procedures of the data link layer	Annex D	–	–	
Provision of multi-selective reject option	Annex E	–	GID	
Protocol Implementation Conformance Statement (PICS) to Recommendation Q.921 for Basic Rate (User-side)	Annex F	–	GID	
Protocol Implementation Conformance Statement (PICS) to Recommendation Q.921 for Basic Rate (Network-side)	Annex G	–	GID	
Protocol Implementation Conformance Statement (PICS) to Recommendation Q.921 for Primary Rate (User-side)	Annex H	–	GID	
Protocol Implementation Conformance Statement (PICS) to Recommendation Q.921 for Primary Rate (Network-side)	Annex I	–	GID	
Inter-exchange signalling data link layer protocol in Private Integrated Services Networks (PISNs)	Annex J (Q.921 Amend-ment 1)	–	GID	Applicability and additions to frame structure, elements of procedures, formats of fields, elements for layer-to-layer communication, peer-to-peer procedures to accommodate PISN inter-exchange requirements
Retransmission of REJ response frame	Appendix I	–	O	
Occurrence of MDL-ERROR-INDICATION within the basic states & actions to be taken by the management entity	Appendix II	–	GID	
Optional basic access deactivation procedures	Appendix III	–	NA	May be used by network side system management to control deactivation of access

Table 5. Annexes and Appendices *(continued)*

Title	ITU-T Rec. Q.921	ETSI TBR 4	CR	Remarks
Automatic negotiation of data link layer parameters	Appendix IV	–	O	
Inter-exchange signalling data link layer protocol in PISNs	Appendix V (Q.921 Amend-ment 1)	–	GID	Occurrence of the MDL-ERROR indication primitive in the data link layer protocol for the support of Inter-exchange signalling in PISNs

Section D. ISDN User-Network Interface Layer 3 Specification for Basic Call Control (ITU-T Recommendation Q.931 05/1998 & Amendment 1 12/2002)

Table 6. Overview of call control

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
General	**1**		GID	
Overview of call control	2		GID	
Circuit switched calls	2.1		GID	
Call states at the user side of the interface	2.1.1	11.1.1	GID	
Null state (U0)	2.1.1.1	11.1.1.1	M	
Call initiated (U1)	2.1.1.2	11.1.1.2	M	
Overlap sending (U2)	2.1.1.3	11.1.1.3	M	See Note
Outgoing call proceeding (U3)	2.1.1.4	11.1.1.4	M	See Note
Call delivered (U4)	2.1.1.5	11.1.1.5	M	See Note
Call present (U6)	2.1.1.6	11.1.1.6	M	Transitory state
Call received (U7)	2.1.1.7	11.1.1.7	O	M if alerting is used
Connect request (U8)	2.1.1.8	11.1.1.8	M	
Incoming call proceeding (U9)	2.1.1.9	11.1.1.9	O	M if call proc. is used
Active (U10)	2.1.1.10	11.1.1.10	M	
Disconnect request (U11)	2.1.1.11	11.1.1.11	M	
Disconnect indication (U12)	2.1.1.12	11.1.1.12	M	
Suspend request (U15)	2.1.1.13	11.1.1.13	O	NA to PRA
Resume request (U17)	2.1.1.14	11.1.1.14	O	NA to PRA
Release request (U19)	2.1.1.15	11.1.1.15	M	
Overlap receiving (U25)	2.1.1.16	11.1.1.16	M	

Table 6. Overview of call control *(continued)*

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
Call states at the network side of the interface	2.1.2	11.1.2	GID	
Packet mode access connections	2.2		NA	
Temporary signalling connections	2.3		–	
States associated with the global call reference	2.4	11.1.3	–	
Call states at the user side of the interface	2.4.1	11.1.3.1	NA	
Null (Rest 0)	2.4.1.1	11.1.3.1.1	NA	
Restart request (Rest 1)	2.4.1.2	11.1.3.1.2	NA	
Restart (Rest 2)	2.4.1.3	11.1.3.1.3	NA	
Call states at the network side of the interface	2.4.2	11.1.3.2	GID	
NOTE. TE may not need this call state, but to fulfil procedures specified in ITU-T Rec. Q.931 section 5 and all its subsections, all TEs must implement the call state.				

Table 7. Message functional definitions and content

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
Message functional definitions and content	3	11.2	GID	
Messages for circuit mode connection control	3.1		GID	
Alerting	3.1.1	11.2.1	M	Note 1
Call proceeding	3.1.2	11.2.2	M	Note 1
Connect	3.1.3	11.2.3	NA	
Connect acknowledge	3.1.4	11.2.4	M	Note 1
Disconnect	3.1.5	11.2.5	M	
Information	3.1.6	11.2.6	M	Note 1
Notify	3.1.7	11.2.7	NA	Note 1
Progress	3.1.8	11.2.8	M	Note 1
Release	3.1.9	11.2.9	M	
Release complete	3.1.10	11.2.10	M	

Table 7. Message functional definitions and content *(continued)*

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
Resume	3.1.11	11.2.11	M	NA to PRA
Resume acknowledge	3.1.12	11.2.12	M	NA to PRA
Resume reject	3.1.13	11.2.13	O	NA to PRA
Setup	3.1.14	11.2.14	O	
Setup acknowledge	3.1.15	11.2.15	O	Note 1 - network to user only
Status	3.1.16	11.2.16	M	
Status enquiry	3.1.17	11.2.17	M	Note 1
Suspend	3.1.18	11.2.18	M	NA to PRA
Suspend acknowledge	3.1.19	11.2.19	M	NA to PRA
Suspend reject	3.1.20	11.2.20	O	NA to PRA
Messages for packet mode connection control	3.2	–	O	Note 2
Messages for user signalling bearer service control	3.3	–	O	
Messages used with the global call reference	3.4	11.2.21	–	Heading
Restart	3.4.1	11.2.21.1	NA	
Restart acknowledge	3.4.2	11.2.21.2	NA	
Status	3.4.3	–	NA	

NOTES:

1. It is optional whether a TE ever transmits this message but all TEs shall be able to receive the message and handle it correctly as defined in the procedures specified in ITU-T Rec. Q.931 section 5 and all its subsections.

2. The message shall be used if Case B (packet switched access to an ISDN virtual circuit service) as defined in ITU-T Rec. Q.931 section 6 is implemented.

Table 8. General message format and information element coding

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
General message format and information element coding	4	11.3	M	
Overview	4.1	11.3.1	M	
Protocol discriminator	4.2	11.3.2	M	
Call reference	4.3	11.3.3	M	One octet call reference for PRA is not supported.
Message type	4.4	11.3.4	M	
Other information elements	4.5	11.3.5	–	Heading
Coding rules	4.5.1	11.3.5.1	M	
Extensions of codesets	4.5.2	11.3.5.2	M	
Locking shift procedure	4.5.3	11.3.5.3	M	
Non-locking shift procedure	4.5.4	11.3.5.4	M	
Bearer capability	4.5.5	11.3.5.5	–	
Call identity	4.5.6	11.3.5.6	O	NA to PRA
Call state	4.5.7	11.3.5.7	M	
Called party number	4.5.8	11.3.5.8	M	
Called party subaddress	4.5.9	11.3.5.9	O	
Calling party number	4.5.10	–	O	
Calling party subaddress	4.5.11	–	O	
Cause	4.5.12	11.3.5.10	M	Note 1
Channel identification	4.5.13	11.3.5.11	M	Note 1
Congestion level	4.5.14	–	NA	
Date/time	4.5.15	–	O	Note 2
Display	4.5.16	–	O	Note 2
High layer compatibility	4.5.17	11.3.5.12	O	Note 3
Keypad facility	4.5.18		O	
Low layer compatibility	4.5.19	11.3.5.13	O	Note 3
More data	4.5.20	–	NA	

Table 8. General message format and information element coding *(continued)*

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
Network-specific facilities	4.5.21	–	NA	
Notification indicator	4.5.22	11.3.5.14	M	
Progress indicator	4.5.23	11.3.5.15	M	Note 1
Repeat indicator	4.5.24	–	NA	
Restart indicator	4.5.25	11.3.5.16	O	
Segmented message	4.5.26	–	NA	
Sending complete	4.5.27	11.3.5.17	O	Note 4
Signal	4.5.28	–	O	
Transit network selection	4.5.29	–	O	
User to user	4.5.30	–	O	
Information elements for packet communications	4.6	–	O	

NOTES:

1. It is optional whether a TE ever transmits this information element but all TEs shall be able to receive the information element and handle it correctly as defined in the procedures specified in ITU-T Rec. Q.931 section 5 and all its subsections.

2: It is mandatory that the TE recognises the information element but it is optional whether the contents of the information element are displayed.

3. Support of the HLC/LLC information elements is optional. However, ITU-T Rec. relating to a specific terminal type may require the support to be mandatory for those specific types of terminals.

4. It is optional for a TE to generate this information element, but TEs which implement the Overlap receiving procedure shall recognise the information element and handle it correctly as defined in the procedures specified in ITU-T Rec. Q.931 section 5 and all its subsections.

Table 9. Circuit-switched call control procedures

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
Circuit-switched call control procedures	5	–	M	Note 1
Call establishment at originating interface	5.1	11.4.1	M	
Call request	5.1.1	11.4.1.1	M	
B-channel selection - originating	5.1.2	–	M	
Overlap sending	5.1.3	11.4.1.2	O	Note 2
Invalid call information	5.1.4	–	NA	
Call proceeding	5.1.5	11.4.1.3		Heading
Call proceeding, enbloc sending	5.1.5.1	11.4.1.3.1	O	
Call proceeding, overlap sending	5.1.5.2	11.4.1.3.2	O	Note 2
Notification of interworking at the originating interface - receipt of - generation of	5.1.6	–	 M O	
Call confirmation indication	5.1.7	11.4.1.4	M	
Call connected	5.1.8	11.4.1.5	M	
Call rejection	5.1.9	–	NA	
Transit network selection	5.1.10	–	O	
Call establishment at destination interface	**5.2**	11.4.2	M	
Incoming call	5.2.1	11.4.2.1	M	
Compatibility checking	5.2.2	11.4.2.2	M	
B-channel selection - destination	5.2.3	11.4.2.3		Heading
SETUP message delivered by point-to-point data link	5.2.3.1	11.4.2.3.1	M	
SETUP message delivered by broadcast data link	5.2.3.2	11.4.2.3.2	NA	NA to PRA
Overlap receiving	5.2.4	11.4.2.4	O	
Call confirmation	5.2.5	–		Heading
Response to enbloc SETUP or completion of overlap receiving	5.2.5.1	11.4.2.5.1	M	
Receipt of CALL PROCEEDING and ALERTING	5.2.5.2	–	NA	
Called user clearing during incoming call establishment	5.2.5.3	–	NA	
Call failure	5.2.5.4	–	NA	
Notification of interworking at terminating interface - receipt of - generation of	5.2.6	–	 M O	

Table 9. Circuit-switched call control procedures *(continued)*

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
Call accept	5.2.7	11.4.2.6	M	
Active indication	5.2.8	11.4.2.7	M	
Non-selected user clearing	5.2.9	11.4.2.8	M	
Call clearing	5.3	11.4.3	–	Heading
Terminology	5.3.1	11.4.3.1	GID	
Exception conditions	5.3.2	11.4.3.2	M	
Clearing initiated by the user	5.3.3	11.4.3.3	M	
Clearing initiated by the network	5.3.4	11.4.3.4	M	
Clearing when tones/ announcements provided	5.3.4.1	11.4.3.4.1	O	
Clearing when tones/ announcement not provided	5.3.4.2	11.4.3.4.2	O	
Completion of clearing	5.3.4.3	11.4.3.4.3	M	
Clear collision	5.3.5	11.4.3.5	M	
In-band tones and announcements	5.4	–	NA	Refer to network operations
Restart procedure	5.5	11.4.8	M	
Sending RESTART message	5.5.1	–	O	
Receipt of RESTART message	5.5.2	–	M	
Status	5.5.3	–	O	
Call re-arrangements	5.6	11.4.4	NA	NA to PRA (Note 3)
Call collision	5.7	11.4.5	GID	
Handling of error conditions	5.8	11.4.6	M	
User notification procedure - Receipt of - Generation of	5.9	11.4.7	NA	NA to PRA (Note 4)
Basic telecommunication service identification and selection	5.10	–	O	
Signalling procedures for bearer capability selection	5.11	–	O	
Signalling procedures for high layer compatibility selection	5.12	–	O	

NOTES:

1. This section is mandatory except for information related to supplementary services, inter ISPBX application, packet calls and the use of the segmentation procedure.

2. TEs which use the overlap sending procedures must be able to receive the SETUP ACKNOWLEDGE message and handle it correctly as defined in section 5.1.3.

3. The use of call re-arrangement procedure is restricted to basic access, i.e. it will not be available for primary rate access.

4. It is optional whether a TE ever transmits a NOTIFY message but all TEs shall be able to receive and handle it correctly as defined in the procedures specified in section 5 and its subsections of ITU-T Rec. Q.931.

Table 10. List of system parameters

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
List of system parameters	9		GID	
Timers in the network side	9.1		–	
Timers in the user side	9.2	Table F3.	–	Refer to Table 9-2/Q.931
T301			NA	Note
T302			NA	Note
T303			O	Note
T304			O	Note
T305			M	30 s
T308			M	4 s
T309			O	Note
T310			O	Note
T313			M	4s
T314			NA	Note
T316			O	Note (2 min)
T317			O	Note (<T316)
T318		–	O	NA to PRA
T319		–	O	NA to PRA
T321		–	O	Note (30 s)
T322		–	O	Note (4 s)
NOTE. Mandatory if the corresponding procedure is implemented, otherwise not applicable.				

Table 11. Packet communication procedures

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
Packet communication procedures	6	–	O	Circuit-switched access to PSPDN services (Case A)
			O	Packet switched access to an ISDN virtual circuit service (Case B) using B-channel
			O	Packet switched access to an ISDN virtual circuit service (Case B) using D-channel

Table 12. User signalling bearer service call control procedures

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
User signalling bearer service call control procedures	7	–	O	

Table 13. Circuit-mode multirate (64 kbit/s base rate) bearer capability

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
Circuit-mode multirate (64 kbit/s base rate) bearer capability	8	–	O	

Table 14. Annexes and Appendices

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
User side and network side SDL diagrams	Annex A	–	GID	Note 1
Compatibility and address checking	Annex B	–	M	Note 2
Transit network selection	Annex C	–	O	
Extension for symmetric call operation	Annex D	–	GID	Not applicable to the user-network interface
Network specific facility selection	Annex E	–	O	
D channel backup procedures	Annex F	–	O	For non-associated signalling applied to multiple primary rate access arrangements only
Use of progress indicators	Annex G	–	M	
Message segmentation procedures	Annex H	–	O	
Low layer information coding principles	Annex I	–	M	
Low layer compatibility negotiation	Annex J	–	O	

Table 14. Annexes and Appendices *(continued)*

Title	ITU-T Rec. Q.931	ETSI TBR 4	CR	Remarks
Procedure for establishment of bearer connection prior to call acceptance	Annex K	–	O	Network option
Optional procedures for bearer service change	Annex L	–	O	
Additional basic call signalling requirements for the support of private network inter-connection for Virtual Private Network applications	Annex M	–	O	
Flexible channel selection	Annex N	–	O	Network option
Definition of cause values	App. I	–	GID	
Example message flow diagrams and example conditions for cause mapping	App. II	–	GID	
Summary of assigned information element identifier and message type code points for the Q.93X - series and Q.95X - series of ITU-T Recommendations	App. III	–	GID	

NOTES:

1. SDL diagrams are used to describe the Q.931 protocol control for circuit switched basic calls. In the event of conflict, the procedures given in section 5 of Q.931 should take precedence.

2. The bearer service requested by the calling user in the Bearer Capability information element shall match the bearer services provided to that user by the network. If a mismatch is detected, the network shall reject the call using one of the causes listed in clause 5.1.5.2. At the called side, the user shall be able to support the bearer service offered by the network in the Bearer Capability information element. If a mismatch is detected, the user shall either ignore or reject the offered call using cause number 88, incompatible destination.

Annex A
(normative)

References

For the technical requirements captured in this Specification, reference has been made to the following documents:

ITU-T Rec. I.431 (03/93)	Primary Rate User-Network Interface – Layer 1 Specification
ITU-T Rec. I.431 Amendment 1 (06/97)	Primary Rate User-Network Interface – Layer 1 Specification Amendment 1
ITU-T Rec. Q.921 (09/97)	ISDN User-Network Interface – Data Link Layer Specification
ITU-T Rec. Q.921 Amendment 1 (02/2000)	ISDN User-Network Interface – Data Link Layer Specification Amendment 1
ITU-T Rec. Q.931 (05/98)	ISDN User-Network Interface Layer 3 Specification for Basic Call Control
ITU-T Rec. Q.931 Amendment 1 (05/98)	ISDN User-Network Interface Layer 3 Specification for Basic Call Control Amendment 1 Extensions for the support of digital multiplexing equipment
Erratum1 (02/2003) to ITU-T Rec. Q.931	ISDN User-Network Interface Layer 3 Specification for Basic Call Control
ITU-T Rec. G.961 03/93	Digital Transmission System on Metallic Local Lines for ISDN Basic Rate Access
ETSI TBR 4 Nov 95	Attachment requirements for terminal equipment to connect to an ISDN using ISDN primary rate access
ETSI TBR 4 A1 Dec 97	This amendment A1 modifies the TBR 4 (1995)
IEC 60950-1: 2001	Information Technology Equipment – Safety IEC
CISPR 22: 2003-04	Information Technology Equipment – Radio disturbance characteristics – Limits and methods of measurement

NOTES:

ETSI European Telecommunications Standards Institute
ETR ETSI Technical Report
IEC International Electro-technical Commission
ITU-T International Telecommunication Union – Telecommunication Sector
TBR Technical Basis for Regulation