

SKMM LTS ISDN-BA
Rev 1.01:2007

**TECHNICAL SPECIFICATION
FOR CONNECTING TO THE
INTEGRATED SERVICES DIGITAL NETWORK
(ISDN)
USING BASIC 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.

<p>NOTICE</p>

<p>This Specification is subject to review and revision</p>
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INTERGRATED SERVICES DIGITAL NETWORK (ISDN) USING BASIC 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 S/T interface using Basic Access (BA). It also identifies the requirements for the digital transmission system at the network side of the Network Termination (NT1) forming part of the ISDN BA.

1.2 ISDN BA equipment connected to the S/T interface (see Figure 1) shall have either Terminal Equipment Type 1 (TE1) or Terminal Adaptor (TA) function incorporated. For such equipment, suppliers shall demonstrate that it 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.430, Basic 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 If the ISDN BA equipment has the NT1 function built-in, suppliers shall demonstrate that it has been tested shall to comply with the requirements defined in Section A, B, C, D as well as Section E.

1.4 If the NT1 function is standalone, suppliers shall demonstrate that the NT1 equipment has been tested to comply with the requirements defined in Section A and E. Section E defines the digital transmission system at the network side of the NT1, and is based on the ITU-T Rec. G.961. The digital transmission system shall use line codes and transmission methods given in Appendix II of the ITU-T Rec. G.961. References to ETSI ETR 080 are given for information only. The TE side of the NT1 shall conform to the network requirements of the ITU-T Rec. I.430.

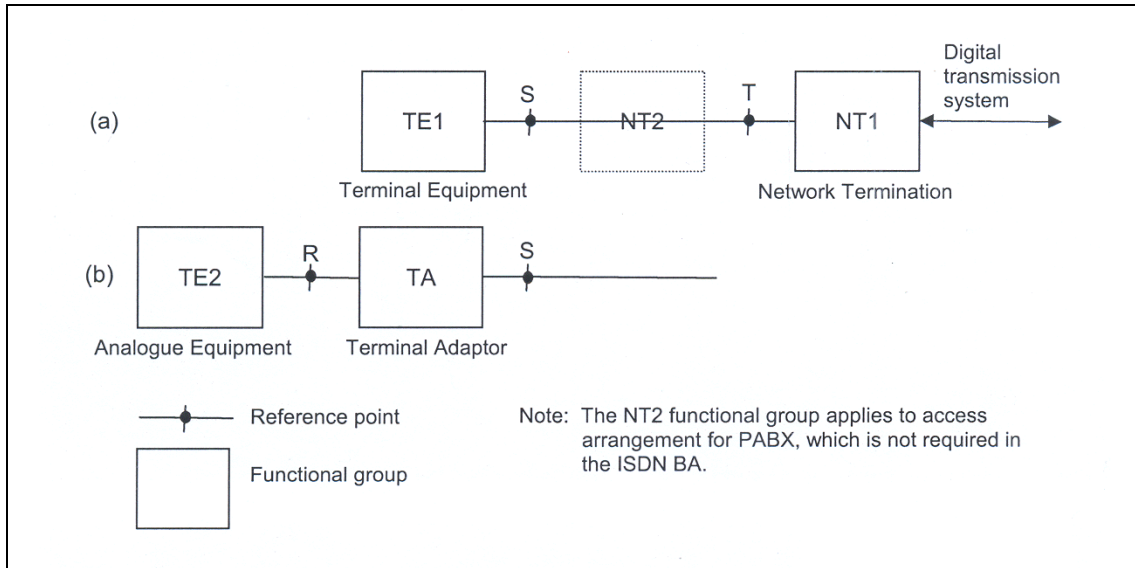


Figure 1. Reference Configurations for ISDN User-Network Interface (Figure 1/I.430)

1.5 Notations used in the Specification

The use of the term TE within the Specification refers to a TE1, a TA or a Network Termination 2 (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 \pm 10%, 50 Hz \pm 2% External A.C. adapter	Note 1 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 shall 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		-
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: \pm 1.8%	Note 2

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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 dB to 11 dB	Note 3
RLR	In the range -1 dB to 5 dB	Note 3
STMR	In the range 10 dB to 15 dB	Note 3

NOTES:

1. Either one of these options shall be applied.
2. Requirement is 'NA' if TE does not have TA function for connecting analogue equipment to the R interface.
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. Electromagnetic 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 standard¹. 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. Basic User-Network Interface – Layer 1 Specification
(ITU-T Recommendation I.430 11/1995)

Table 1. General layer 1 requirements

Title	ITU-T Rec. I.430	ETSI TBR 3	CR	Remarks
General	1	–	GID	
Service characteristics	2	–	–	Heading
Services required from the physical medium	2.1	–	M	A balance metallic transmission medium for each direction of transmission capable of supporting 192 kbit/s
Service provided to layer 2	2.2	–	–	
Primitives between layer 1 and the other entities	2.3	–	M	
Modes of operation	3	–	GID	
Point-to-point operation	3.1	–	M	
Point-to-multipoint operation	3.2	–	M	
Types of wiring configuration	4	–	GID	
Point-to-point configuration	4.1	–	Note	
Point-to-multipoint configuration	4.2	–	Note	
Wiring polarity integrity	4.3	–	M	
Location of the interfaces	4.4	–	GID	
NT and TE associated wiring	4.5	–	M	
NOTE. Either one of these wiring configuration shall be applied.				

Table 2. Functional characteristics

Title	ITU-T Rec. I.430	ETSI TBR 3	CR	Remarks
Functional characteristics	5	–	GID	Heading
Interface functions	5.1	–	–	Heading
B-channel	5.1.1	–	M	For each direction of transmission, provides two independent 64 kbit/s channels for use as B-channels

Table 2. Functional characteristics (continued)

Title	ITU-T Rec. I.430	ETSI TBR 3	CR	Remarks
Bit timing	5.1.2	–	M	Provides bit timing at 192 kbit/s
Octet timing	5.1.3	–	O	Provides 8 kHz octet timing
Frame alignment	5.1.4	–	M	Provides information to enable NT and TE to recover the TDM channels
D-channel	5.1.5	–	M	For each direction of transmission, provides one D- channel at a bit rate of 16 kbit/s
D-channel access procedure	5.1.6	–	M	For procedures relating to D- channel access see Clause 6.1.
Power feeding	5.1.7	–	GID	Refer to Clause 9
Deactivation	5.1.8	–	M	Refer to Clause 6.2
Activation	5.1.9	–	M	Refer to Clause 6.2
Interchange circuits	5.2	–	M	Two interchange circuits, one for each direction of transmission shall be used to transfer digital signals across the interface.
Connected/disconnected indication	5.3	–	M	The criterion used is the appearance/disappearance of power.
TEs powered across the interface	5.3.1	–	M	
TEs not powered across the interface	5.3.2	–	M	
Indication of connection status	5.3.3	–	M	
Frame structure	5.4	–	M	In both direction of transmission, the bits shall be grouped into frames of 48 bits each.
Line code	5.5	9.3.2	M	Figure 4/I.430
Timing considerations	5.6	–	M	A TE shall derive its timing from the signal received from NT and use this derived timing to synchronise its transmitted signal.

Table 3. Interface procedures

Title	ITU-T Rec. I.430	ETSI TBR 3	CR	Remarks
Interface procedures	6	–	–	Heading
D-channel access procedure	6.1	9.4.1	M	
Interframe (layer 2) time fill	6.1.1	9.4.1.1	M	Interframe time fill in the NT to TE direction is HDLC flags.
D-echo channel	6.1.2	–	NA	Network requirement
D-channel monitoring	6.1.3	–	M	
Priority mechanism	6.1.4	9.4.1.2	M	The use of priority class 2 is not a requirement under TBR 3.
Collision detection	6.1.5	9.4.1.3	M	
Priority system	6.1.6	–	M	An example of how the priority system may be implemented.
Activation/deactivation	6.2	9.4.2	–	Heading
Definitions	6.2.1	–	–	Heading
TE states	6.2.1.1	9.4.2.1	M	PS2 is not a requirement under TBR 3. Loss of local power or absence of power from PS1 may be used for determining the connection status.
NT states	6.2.1.2	–	NA	
Activate primitives	6.2.1.3	–	M	
Deactivate primitives	6.2.1.4	–	M	
Management primitives	6.2.1.5	–	O	
Valid primitive sequences	6.2.1.6	–	NA	
Signals	6.2.2	9.4.2.2	M	
Activation/deactivation procedure for TEs	6.2.3	9.4.2.3	M	
Activation/deactivation for NTs	6.2.4	–	NA	
Timer values	6.2.5	9.4.2.3.2	O	Timer 3 < 30 s
Activation times	6.2.6	–	–	Heading
TE activation times	6.2.6.1	9.4.2.4	M	
NT activation times	6.2.6.2	–	NA	

Table 3. Interface procedures (continued)

Title	ITU-T Rec. I.430	ETSI TBR 3	CR	Remarks
Deactivation times	6.2.7	9.4.2.5	M	
Frame alignment procedures	6.3	9.4.3	M	
Frame alignment procedure in the direction NT to TE	6.3.1	9.4.3 Note 1	M	Loss of frame alignment is assumed when a time period equivalent to 2 ("n" in the case of TBR 3) 48-bit frames has elapsed without having detected valid pairs of line code violations obeying the ≤ 14 -bit criterion as described in § 5.4.2.2. Frame alignment may be assumed to occur when 3 ("m" in the case of TBR 3) consecutive pairs of line code violations obeying the ≤ 14 -bit criterion have been detected.
Frame alignment in the direction TE to NT	6.3.2	–	NA	
Multiframing	6.3.3	9.4.4 Note 2	O	The use of Q-channel and S- channel is optional.
S-channel structuring algorithm	6.3.4	–	O	The use of S-channel is optional.
Idle channel code on the B-channels	6.4	9.4.5	M	
NOTES:				
1. In TBR 3, "n" is a value between 2 to 20, and "m" is a value between 3 and 100. There is no requirement for "m" and "n" to remain constant under all circumstances of loss and recovery of frame alignment. The recommended values for "m" and "n" are 5.				
2. Under TBR 3, when the TE receives an FA bit which is binary ZERO, it shall send a binary ZERO in the corresponding FA bit position of the frame transmitted to the NT. No requirement applies when the FA bit received is a binary ONE.				

Table 4. Layer 1 maintenance

Title	ITU-T Rec. I.430	ETSI TBR 3	CR	Remarks
Layer 1 maintenance	7	–		Heading
Provision for operational and maintenance functions between terminal and NT1	7.1	–	O	

Table 5. Electrical characteristics

Title	ITU-T Rec. I.430	ETSI TBR 3	CR	Remarks
Bit rate	8.1	9.2.1	M	192 kbit/s \pm 100 ppm
Jitter and bit-phase relationship between TE input and output	8.2	9.2.2	–	Heading
Test configurations	8.2.1	9.2.2.1	GID	
Timing extraction jitter	8.2.2	9.2.2.2	M	\pm 7%
Total phase deviation input to output	8.2.3	9.2.2.3 Note 1	M	-7% to +15%
NT jitter characteristics	8.3	–	NA	
Termination of the line	8.4	–	NA	
Transmitter output characteristics	8.5	9.2.3	–	Heading
Transmitter output impedance	8.5.1	–	GID	
NT transmitter output impedance	8.5.1.1	–	NA	
TE transmitter output impedance	8.5.1.2	9.2.3	M	
Test load impedance	8.5.2	–	M	50 Ω
Pulse shape and amplitude (binary ZERO)	8.5.3	9.2.4	Heading	Figure 13/I.430 750 mV
Pulse unbalance	8.5.4	9.2.5	M	Within the threshold as given in figure 9.5 (TBR 3) / Figure 13/I.430 \leq 5%
Voltage on other test loads (TE only)	8.5.5	9.2.6.1 9.2.6.2	M	400 Ω load and 5.6 Ω load
Unbalance about earth	8.5.6	–	M	10 kHz $\leq f \leq$ 300 kHz : \geq 54 dB 300 kHz $< f \leq$ 1 MHz : min. value decreasing from 54 dB at 20 dB/decade
Longitudinal conversion loss (LCL) of the transmitter output	–	9.2.7	–	10 kHz $\leq f \leq$ 300 kHz : \geq 54 dB
Receiver input characteristics	8.6	–	–	Heading
Receiver input impedance	8.6.1	–	–	Heading
TE receiver input impedance	8.6.1.1	9.2.8	M	As specified in § 8.5.1.2/I.430
NT receiver input impedance	8.6.1.2	–	NA	
Receiver sensitivity – Noise and distortion immunity	8.6.2	9.2.9	M	

Table 5. Electrical characteristics (continued)

Title	ITU-T Rec. I.430	ETSI TBR 3	CR	Remarks
TEs	8.6.2.1	9.2.9	M	
NTs for short passive bus	8.6.2.2	–	NA	
NTs for point-to-point and short passive	8.6.2.3	–	NA	
NTs for extended passive bus	8.6.2.4	–	NA	
NTs for point-to-point configuration	8.6.2.5	–	NA	
NT receiver input delay characteristics	8.6.3	–	NA	
Unbalance about earth	8.6.4	–	M	10 kHz ≤ f ≤ 300 kHz : ≥ 54 dB 300 kHz < f ≤ 1 MHz : min. value decreasing from 54 dB at 20 dB/decade
–	–	9.2.10	–	Longitudinal Conversion Loss (LCL) of receiver inputs 10 kHz ≤ f ≤ 300 kHz : ≥ 54 dB
Isolation from external voltages	8.7	–	GID	
Interconnecting media characteristics	8.8	–	M	
Standard ISDN basic access TE cord	8.9	9.1.4	M	
Longitudinal output voltage	8.10	–	GID	
Electromagnetic compatibility (EMC)	8.11	–	Note 2	
NOTES: 1. The limitation applies for input bit rates of 192 kbit/s ± 1 ppm. 2. EMC requirements are specified in § 3 of this Specification.				

Table 6. Power feeding

Title	ITU-T Rec. I.430	ETSI TBR 3	CR	Remarks
Power feeding	9	9.5	–	Heading
Reference configuration	9.1	–	M	The use of leads c, d, e and f is mandatory.
Functions specified at the access leads	9.1.1	9.5.1	M	9.1.1 i) is mandatory.
Provision of power sources and sinks	9.1.2	–	O	PS3 is not used.

Table 6. Power feeding (continued)

Title	ITU-T Rec. I.430	ETSI TBR 3	CR	Remarks
Power feeding voltage	9.1.3	–	M	Basic voltage range is 34 V to 42 V from the power source.
Power available from NT	9.2	–	O	Heading
Power source 1 normal and restricted mode	9.2.1	–	O	
Voltage NT from power source 1	9.2.2	–	O	
Voltage of power source 2	9.2.3	–	O	
Short circuit protection	9.2.4	–	M	
Power available at TE	9.3	–	O	Heading
Power consumption unit	9.3.1	–	O	
Power source 1 - Phantom powering	9.3.2	–	O	
Power source 2 - Optional third pair	9.3.3	–	O	
PS1 current transient	9.4	9.5.2	M	Applicable to TE drawing from power source 1
TE power consumption	9.5	–	GID	Heading
Power source 1	9.5.1	9.5.3	M	Applicable when power sink 1 is implemented
Power source 2	9.5.2	Note 1	M	Applicable when power sink 2 is implemented
Galvanic isolation	9.6	9.5.4 Note 2	M	Isolation shall be a minimum of 1 M Ω when measured at 500 V d.c.
Limitations on power source and sink during transient condition	9.7	9.5.5	GID	
Current/time limitations for TEs	9.7.1	–	–	Heading
Terminals powered from power source 1	9.7.1.1	9.5.5.1	O	Applicable when power sink 1 is implemented
Terminals powered from power source 2	9.7.1.2	Note 1	O	Applicable when power sink 2 is implemented
Power source switchover time (PS1 or PS2)	9.7.2	–	O	Applicable when switchover is implemented
Other TE requirements	9.7.3	9.5.5.2	–	Heading
Minimum TE start up current from power source 1	9.7.3.1	9.5.5.2.1	O	Applicable when power sink 1 is implemented
Minimum TE start up current from power source 2	9.7.3.2	Note 1	O	Applicable when power sink 2 is implemented

Table 6. Power feeding (continued)

Title	ITU-T Rec. I.430	ETSI TBR 3	CR	Remarks
Verification	9.7.3.3	–	GID	Test circuit given in Clause I.6
Protection against short term interruptions	9.7.3.4	9.5.5.2.2	M	
Behaviour at switch-over	9.7.3.5	9.5.5.2.3	O	Applicable when switch-over is implemented
Effective capacitance at the PS1 or PS2 input to the TE	9.7.3.6	–	GID	
TE behaviour at low input voltage	9.7.3.7	–	GID	
Other power source requirements	9.7.4	–	O	
PS1 direct current unbalance	9.8	–	GID	
TE requirements	9.8.1	9.5.5.3	O	
NT requirements	9.8.2	–	NA	
Additional requirements for an auxiliary power supply (APS)	9.9	–	NA	
Additional requirements for NT1 restricted mode source for compatibility with an APS	9.10	–	NA	
NOTES:				
1. Under TBR 3, PS2 is not supported.				
2. Under TBR 3, for galvanic connection to earth, the direct current between PS1 and any earth connection on the TE shall not exceed 100µA.				

Table 7. Interface connector contact assignments

Title	ITU-T Rec. I.430	ETSI TBR 3	CR	Remarks
Interface connector contact assignments	10	9.1 Note	M	Contacts a, b, g and h are not used.
NOTE. The use of contacts a, b, g and h for PS2 and PS3 is outside the scope of TBR 3.				

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

Table 8. Frame structure for peer-to-peer communication

Title	ITU-T Rec. Q.921	ETSI TBR 3	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 3 requirement
NOTE. TBR 3 includes a frame which contains a TEI that is not assigned to the TE as invalid.				

Table 9. Elements of procedure and formats of field for data link layer peer-to-peer communication

Title	ITU-T Rec. Q.921	ETSI TBR 3	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	–	
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	–	

Table 9. Elements of procedure and formats of field for data link layer peer-to-peer communication (continued)

Title	ITU-T Rec. Q.921	ETSI TBR 3	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	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
Exchange Identification (XID) command/response	3.6.12	–	M	Note
NOTE. TBR 3 does not support FRMR response and XID command/response.				

Table 10. Elements for layer-to-layer communication

Title	ITU-T Rec. Q.921	ETSI TBR 3	CR	Remarks
Elements for layer-to-layer communication	4	–	GID	

Table 11. Procedures for use by the data link layer

Title	ITU-T Rec. Q.921	ETSI TBR 3	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	
Acknowledged multiple frame information transfer	5.1.2	10.6 and 10.7	M	
Procedure for unacknowledged information transfer	5.2	10.4	–	Note 1
Terminal Endpoint Identifier (TEI) management procedures	5.3	10.5	–	
General	5.3.1	10.5.1	M	Note 2
TEI assignment procedure	5.3.2	10.5.2	M	Note 2
TEI check procedure	5.3.3	–	–	Heading
Use of TEI check procedure	5.3.3.1	–	NA	
Operation of the TEI check procedure	5.3.3.2	10.5.3	M	Note 3
TEI removal procedure	5.3.4	10.5.4	M	Note 3
TEI identity verify procedure	5.3.5	10.5.5	O	Note 3
Formats and codes	5.3.6	10.5.6	–	Note 3
Initialisation of data link layer parameters	5.4	–	NA	Note 4
Procedure for establishment and release of multiple frame operation	5.5	10.6	–	Heading
Establishment of multiple frame operation	5.5.1	10.6.1	M	
Information transfer	5.5.2	10.4, 10.7 and 10.8	M	Refer to Clauses 5.2, 5.6 and 5.7
Termination of multiple frame operation	5.5.3	10.6.2	–	
TEI-assigned state	5.5.4	–	M	
Collision of unnumbered commands and responses	5.5.5	10.6.3	–	
Unsolicited DM response and SABME or DISC command	5.5.6	–	M	
Procedure for information transfer in multiple frame operation	5.6	10.7	M	

Table 11. Procedures for use by the data link layer (continued)

Title	ITU-T Rec. Q.921	ETSI TBR 3	CR	Remarks
Re-establishment of multiple frame operation	5.7	10.8	–	
Exception condition reporting and recovery	5.8	10.9 Note 5	GID	
List of system parameters	5.9	10.10	GID	
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	The default value shall be 3.
Max number of outstanding I frames (k)	5.9.5	10.10.5	M	For a SAP supporting basic access signalling, the value is 1.
Timer T201	5.9.6	–	NA	Network requirement
Timer T202	5.9.7	10.10.6	M	The default value shall be 2 s.
Timer T203	5.9.8	–	O	The default value is 10 s.
–	–	10.10.7 Note 6	GID	Layer 2 response time
Data link monitor function	5.10	–	O	
<p>NOTES:</p> <ol style="list-style-type: none"> 1. 'NA' if TE is an ISPBX and supports configuration using only a single point-to-point data link. 2. 'NA' if TE supports configuration using only a single point-to-point data link. Requirements are applicable if TE is ISPBX. 3. 'NA' if TEI assignment procedure is 'NA'. 4. The data link layer parameters shall be initialised to default values. 5. TBR 3 considers the receipt of an invalid N(R) as the only condition for frame rejection. 6. The maximum time between receipt of an incoming frame, and generation of a response shall not exceed (a) 500 ms if operating in a point-to-point signalling connection; and (b) 200 ms for TEs in point- to-multipoint configuration. 				

Table 12. Annexes and Appendices

Title	ITU-T Rec. Q.921	ETSI TBR 3	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. TEI management procedures are not applicable.
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	–	–	
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	–	NA	
Protocol Implementation Conformance Statement (PICS) to Recommendation Q.921 for Primary Rate (Network-side)	Annex I	–	NA	
Inter-exchange signalling data link layer protocol in Private Integrated Services Networks (PISNs)	Annex J (Q.921 Amendment 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	–	NA	

Table 12. Annexes and Appendices (continued)

Title	ITU-T Rec. Q.921	ETSI TBR 3	CR	Remarks
Occurrence of MDL-ERROR-INDICATION within the basic states & actions to be taken by the management entity	Appendix II	–	M	
Optional basic access deactivation procedures	Appendix III	–	NA	May be used by network side system management to control deactivation of access
Automatic negotiation of data link layer parameters	Appendix IV	–	NA	
Inter-exchange signalling data link layer protocol in PISNs	Appendix V (Q.921 Amendment 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 13. Overview of call control

Title	ITU-T Rec. Q.931	ETSI TBR 3	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	Note 1
Outgoing call proceeding (U3)	2.1.1.4	11.1.1.4	M	Note 1
Call delivered (U4)	2.1.1.5	11.1.1.5	M	Note 1
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	
Resume request (U17)	2.1.1.14	11.1.1.14	O	
Release request (U19)	2.1.1.15	11.1.1.15	M	
Overlap receiving (U25)	2.1.1.16	11.1.1.16	O	
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	O	Note 2
Call states at the user side of the interface	2.4.1	11.1.3.1	NA	

Table 13. Overview of call control (continued)

Title	ITU-T Rec. Q.931	ETSI TBR 3	CR	Remarks
Null (Rest 0)	2.4.1.1	11.1.3.1.1	NA	Note 2
Restart request (Rest 1)	2.4.1.2	11.1.3.1.2	NA	Note 2
Restart (Rest 2)	2.4.1.3	11.1.3.1.3	NA	Note 2
Call states at the network side of the interface	2.4.2	11.1.3.2	GID	
NOTES:				
1. TE may not need this call state, but to fulfil procedures specified in ITU-T Rec. Q.931 § 5 and all its subsections, all TEs shall implement this call state.				
2. 'NA' if TE supports point-to-multipoint configuration only.				

Table 14. Message functional definitions and content

Title	ITU-T Rec. Q.931	ETSI TBR 3	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	
Resume	3.1.11	11.2.11	M	Note 2
Resume acknowledge	3.1.12	11.2.12	M	Note 2
Resume reject	3.1.13	11.2.13	O	Note 2
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	Note 2

Table 14. Message functional definitions and content (*continued*)

Title	ITU-T Rec. Q.931	ETSI TBR 3	CR	Remarks
Suspend acknowledge	3.1.19	11.2.19	M	Note 2
Suspend reject	3.1.20	11.2.20	O	Note 2
Messages for packet mode connection control	3.2	–	NA	Note 3
Messages for user signalling bearer service control	3.3	–	NA	
Messages used with the global call reference	3.4	11.2.21	–	Heading
Restart	3.4.1	11.2.21.1	NA	Note 4
Restart acknowledge	3.4.2	11.2.21.2	NA	Note 4
Status	3.4.3	–	NA	Note 4
<p>NOTES:</p> <p>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 § 5 and all its subsections.</p> <p>2. The support of call re-arrangement is optional. However, if call re-arrangement is implemented then RESUME, RESUME ACKNOWLEDGE, RESUME REJECT, SUSPEND, SUSPEND ACKNOWLEDGE, SUSPEND REJECT messages must be implemented.</p> <p>3. 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.</p> <p>4. 'NA' if TE supports point-to-multipoint configuration only.</p>				

Table 15. General message format and information elements coding

Title	ITU-T Rec. Q.931	ETSI TBR 3	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	
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	See Table 4-3/Q.931 Amendment 1
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	

Table 15. General message format and information elements coding (continued)

Title	ITU-T Rec. Q.931	ETSI TBR 3	CR	Remarks
Bearer capability	4.5.5	11.3.5.5	M	See Figure 4.11 and Table 4-6/Q.931 Amendment 1
Call identity	4.5.6	11.3.5.6	O	
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 4
Display	4.5.16	–	O	Note 4
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	NA	Note 3
More data	4.5.20	–	NA	
Network-specific facilities	4.5.21	–	M	
Notification indicator	4.5.22	11.3.5.14	M	
Progress indicator	4.5.23	11.3.5.15	NA	Note 1
Repeat indicator	4.5.24		O	
Restart indicator	4.5.25	11.3.5.16	O	
Segmented message	4.5.26	–	O	
Sending complete	4.5.27	11.3.5.17	O	Note 2
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	
<p>NOTES:</p> <ol style="list-style-type: none"> 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 § 5 and all its subsections. 2. 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 § 5 and all its subsections. 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 mandatory that the TE recognises the information element but it is optional whether the contents of the information element are displayed. 				

Table 16. Circuit-switched call control procedures

Title	ITU-T Rec. Q.931	ETSI TBR 3	CR	Remarks
Circuit-switched call control procedures	5	–	M	Note 13
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 14
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 14
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	O	Note 15
SETUP message delivered by broadcast data link	5.2.3.2	11.4.2.3.2	O	Note 15
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	

Table 16. Circuit-switched call control procedures (continued)

Title	ITU-T Rec. Q.931	ETSI TBR 3	CR	Remarks
Notification of interworking at terminating interface - receipt of - generation of	5.2.6	–	M O	
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	Note 1
Sending RESTART message	5.5.1	–	O	Note 1
Receipt of RESTART message	5.5.2	–	M	Note 1
Call re-arrangements	5.6	11.4.4	O	Note 2
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	O	Note 3
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. 'NA' if TE supports point-to-multipoint configuration only. 2. The use of call re-arrangement procedure is restricted to basic access, i.e. it will not be available for primary rate access, and is also network implementation dependent. 3. It is optional whether a TE ever transmits a NOTIFY message but all TEs must be able to receive and handle it correctly as defined in the procedures specified in § 5 and its subsections of ITU-T Rec. Q.931.				

Table 17. List of system parameters

Title	ITU-T Rec. Q.931	ETSI TBR 3	CR	Remarks
List of system parameters	9		GID	
Timers in the network side	9.1		NA	
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	Note (4 s)
T319		–	O	Note (4 s)
T321		–	O	Note
T322		–	O	Note (4 s)
NOTE: Mandatory if the corresponding procedure is implemented, otherwise not applicable.				

Table 18. Packet communication procedures

Title	ITU-T Rec. Q.931	ETSI TBR 3	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 19. User signalling bearer service call control procedures

Title	ITU-T Rec. Q.931	ETSI TBR 3	CR	Remarks
User signalling bearer service call control procedures	7	–	O	

Table 20. Circuit-mode multirate (64 kbit/s base rate) bearer capability

Title	ITU-T Rec. Q.931	ETSI TBR 3	CR	Remarks
Circuit-mode multirate (64 kbit/s base rate) bearer capability	8	–	O	

Table 21. Annexes and Appendices

Title	ITU-T Rec. Q.931	ETSI TBR 3	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	–	NA	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	
Procedure for establishment of bearer connection prior to call acceptance	Annex K	–	O	Network option
Optional procedures for bearer service change	Annex L	–	O	

Table 21. Annexes and Appendices (continued)

Title	ITU-T Rec. Q.931	ETSI TBR 3	CR	Remarks
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	Appendix I	–	GID	
Example message flow diagrams and example conditions for cause mapping	Appendix II	–	GID	
Signalling for tandem mode operation of Digital Multiplexing Equipment with Low-bit-rate Voice CODEC (DME with LVC)	Appendix III (Q.931 Amendment 1)	–	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	Appendix IV (Q.931 Amendment 1)	–	GID	
<p>NOTES:</p> <p>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 § 5 of Q.931 should take precedence.</p> <p>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 § 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.</p>				

Section E. Digital Transmission System on Metallic Local Lines for ISDN Basic Rate Access (ITU-T Recommendation G.961 03/1993)

Table 22. Digital transmission system on metallic local lines for ISDN basic rate access

Title	ITU-T Rec. G.961	ETSI ETR 080	CR	Remarks
General	1	1 to 3	GID	
Functions	2	4	M	Bit timing shall be derived from the clock received by the NT1 from LT. 8 kHz octet timing is derived from frame alignment. Remote power feeding is supported.
Transmission Medium	3	5	GID	The transmission medium is the local line distribution network.
System Performance	4	6	GID	
Transmission method	5	7	M	Duplex transmission on 2-wire metallic local lines shall be achieved through the use of Echo Cancellation (ECH).
Activation / Deactivation	6	8	–	Heading
General	6.1	8.1	GID	
Physical representation of signals	6.2	8.2	M	The signals used in the DTS are in accordance with the requirements for a system using 2B1Q line code as given in Appendix II/ G.961.
Operation and Maintenance	7	9	–	Heading
Operation and maintenance functions	7.1	9.1	GID	
CL channel	7.2	9.2	M	
Power Feeding	8	10	–	Heading
General	8.1	10.1	GID	
Power feeding options	8.2	10.2	M	Power feeding of NT1 (to TE) under normal conditions will be provided by the AC mains power.
			O	A restricted condition will be entered into when AC mains power at the NT1 fails.

Table 22. Digital transmission system on metallic local lines for ISDN basic rate access (continued)

Title	ITU-T Rec. G.961	ETSI ETR 080	CR	Remarks
Power feeding and recovery methods	8.3	–	GID	
DLL resistance	8.4	10.3	GID	
Wetting current	8.5	10.4	O	The NT1 shall sink a current of at least 200 μ A in its operating voltage range.
LT aspects	8.6	10.5	M	The NT1 shall be able to work with DC input voltages of ≤ 95 V coming from the DLL.
Power requirements of NT1 and regenerator	8.7	10.6	–	Heading
Power requirements of NT1	8.7.1	10.6.1	M	
Power requirements of regenerator	8.7.2	10.6.2	NA	
Current transient limitation	8.8	10.7	M	< 1 mA/ μ s
Environmental Conditions	9	11	GID	

Table 23. Core requirements for a system using 2B1Q line code (ITU-T Rec. Q.961 Appendix II)

Title	ITU-T Rec. G.961	ETSI ETR 080	CR	Remarks
Line code	II.1	A.1	M	The line code shall be 2B1Q (2 binary, 1 quaternary).
Line baud rate	II.2	A.2	M	The line symbol rate is 80 kbauds.
Clock tolerance	II.2.1	–		Heading
NT1 clock tolerance	II.2.1.1	A.2.1	M	± 100 ppm NT1 shall operate with the received signal baud rate in the range of 80 kbaud ± 5 ppm.
LT clock tolerance	II.2.1.2	A.2.2	GID	± 5 ppm
REG clock tolerance	–	A.2.3	GID	
Frame structure	II.3	A.3	M	Figure II.2/G.961
Frame length	II.3.1	A.3.1	M	120 quaternary

Table 23. Core requirements for a system using 2B1Q line code (ITU-T Rec. Q.961 Appendix II) (continued)

Title	ITU-T Rec. G.961	ETSI ETR 080	CR	Remarks
Bit allocation in direction LT-NT1	II.3.2	A.3.2	M	Figures II.1/G.961 and II.2/G.961
Bit allocation in direction NT1-LT	II.3.3	A.3.3	M	Figures II.1/G.961 and II.2/G.961
Frame word	II.4	A.4	M	
Frame alignment procedure	II.5	A.5	M	The time limits specified in II.10 shall be met.
Multiframe	II.6	A.6	M	A multiframe is used to enable the allocation of the C _L -channel bits over more than one frame.
Frame offset between LT-NT1 and NT1-LT frames	II.7	A.7	M	Transmitted frames shall be offset with respect to received frames by 60 ± 2 quaternary symbols (i.e. about 0.75 ms).
C _L -channel	II.8	A.8	M	The bit rate for the C _L -channel is 4 kbit/s.
Bit rate	II.8.1	A.8.1	M	
Structure	II.8.2	A.8.2	M	Figure II.3/G.961
Protocol and procedures	II.8.3	A.8.3	M	Figure II.3/G.961
Error monitoring functions	II.8.3.1	A.8.3.1	M	
Other C _L - channel functions	II.8.3.2	A.8.3.2	M	
Far end block error (FEBE) bit. mandatory	II.8.3.2.1	A.8.3.2.1	M	
The ACT bit, mandatory	II.8.3.2.2	A.8.3.2.2	M	
The DEA bit, mandatory	II.8.3.2.3	A.8.3.2.3	M	
NT1 power status bits	II.8.3.2.4	A.8.3.2.4	O	
NT1 test mode indicator (NTM) bit	II.8.3.2.5	A.8.3.2.5	O	
Cold-start-only (CSO) bit	II.8.3.2.6	A.8.3.2.6	O	
DLL-only-activation (UOA) bit	II.8.3.2.7	A.8.3.2.7	O	
S/T-interface-activity-indicator (SAI) bit	II.8.3.2.8	A.8.3.2.8	O	
Alarm indicator bit (AIB)	II.8.3.2.9	A.8.3.2.9	O	
Network indicator bit (NIB) for network use	II.8.3.2.10	A.8.3.2.10	M	The NT1 shall always set this bit to binary ONE in SN3.
Reserved bits	II.8.3.2.11	A.8.3.2.11	M	
Embedded operations channel (EOC) functions	II.8.3.3	A.8.3.3	M	
Scrambling	II.9	A.9	M	

Table 23. Core requirements for a system using 2B1Q line code (ITU-T Rec. Q.961 Appendix II) (continued)

Title	ITU-T Rec. G.961	ETSI ETR 080	CR	Remarks
Start-up and control	II.10	A.10 Note	M	The NT1 shall be able to support both cold-start and warm-start.
Signals used for start-up and control	II.10.1	A.10.1	M	
Timers	II.10.2	A.10.2	M	
Description of the start-up procedure	II.10.3	A.10.3	M	Heading
State transition table for the NT1	II.10.4	A.10.4	M	
State transition table for the LT	II.10.5	A.10.5	GID	
Activation times	II.10.6	A.10.6	M	
Jitter	II.11	A.11	M	
Input signal jitter tolerance	II.11.1	A.11.1	M	Figure II.10/G.961
NT1 output jitter limitations	II.11.2	A.11.2	M	
LT input signal jitter tolerance	II.11.3	A.11.3	GID	
LT output jitter and synchronisation	II.11.4	A.11.4	GID	
Test conditions for jitter measurement	II.11.5	A.11.5	GID	
Transmitter output characteristics of NT1 and LT	II.12	A.12	M	Load impedance of 135 ohms resistive over a frequency band of 0 Hz to 160 kHz
Pulse amplitude	II.12.1	A.12.1	M	2.5 V (Figure II.11/G.961)
Pulse shape	II.12.2	A.12.2	M	The transmitted pulse shall have the shape specified in Figure II.11/G.961. The pulse mask for the four quaternary symbols shall be obtained by multiplying the normalized pulse mask shown in Figure II.11 by 2.5 V, 5/6 V, -5/6 V or -2.5 V.
Signal power	II.12.3	A.12.3	M	Between 13.0 dBm and 14.0 dBm over the frequency band from 0 Hz to 80 kHz
Power spectral density	II.12.4	A.12.4	M	Figure II.12/G.961
Transmitter linearity	II.12.5	A.12.5	M	
Transmitter/receiver termination	II.13	A.13	-	Heading
Impedance	II.13.1	A.13.1	M	135 Ω
Return loss	II.13.2	A.13.2	M	Figure II.14/G.961
Longitudinal conversion loss	II.13.3	A.13.3	M	Figure II.15/G.961
NOTE: The use of cold-start-only transceivers is outside the scope of ETR 080.				

Table 24. Extension functions of the system using 2B1Q line code (Annex A to ITU-T Rec. Q.961 Appendix II)

Title	ITU-T Rec. G.961	ETSI ETR 080	CR	Remarks
Introduction	A.II.1	I-1	GID	
NT1 power status bits	A.II.2	I-2	O	
NT1 test mode indicator (NTM) bit	A.II.3	I-3	O	
Cold-start-only (CSO) bit	A.II.4	I-4	O	
DLL-only -activation (UOA) bit	A.II.5	I-5	O	
S/T-interface-activity-indicator (SAI) bit	A.II.6	I-6	O	
Alarm indicator bit (AIB)	A.II.7	I-7	O	
Longitudinal output voltage	A.II.8	–	GID	
NT1 maintenance modes	A.II.9	–	O	
NT1 Quiet Mode	A.II.9.1	–	O	
Insertion Loss Measurement Test	A.II.9.2	–	O	
NT1 Quiet Mode and Insertion Loss Measurement Test trigger signal	A.II.9.3	–	O	
Dc signalling format	A.II.9.4	–	O	
Low frequency ac signalling format	A.II.9.5	–	O	

Annex A
(normative)

Normative references

ITU-T Rec. I.430 (11/95)	Basic User-Network Interface – Layer 1 Specification
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 3 Nov 95	Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access
ETSI TBR 3 A1 Dec 97	This amendment A1 modifies the TBR 3 (1995)
ETR 080 Nov 96	Digital transmission system on metallic local lines
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