



AMENDMENT

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A2

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**This amendment A2 modifies
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**Integrated Services Digital Network (ISDN);
Primary rate user-network interface;
Layer 1 specification and test principles**

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Foreword

This amendment to ETS 300 011 (1992) has been produced by the Transmission and Multiplexing (TM) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This second amendment incorporates the changes introduced by Amendment 1 (1994) to ETS 300 011. Newly introduced modifications are indicated by a revision bar located at the left margin.

This second amendment adds a new annex F and related references, definitions and abbreviations to ETS 300 011.

Transposition dates	
Date of adoption of this amendment:	22 September 1995
Date of latest announcement of this amendment (doa):	30 June 1996
Date of latest publication or endorsement of this amendment (dop/e):	31 December 1996
Date of withdrawal of any conflicting National Standard (dow):	31 December 1996

Amendments

Page 12, clause 2

Add the following references to the Normative references clause (clause 2):

- [16] CCITT Recommendation I.112 (1988): "Vocabulary of terms for ISDNs".
- [17] CCITT Recommendation Q.9 (1988): "Vocabulary of switching and signalling terms".
- [18] ISO/IEC 9646-1 (1991): "OSI Conformance Testing Methodology and Framework Part 1: General Concepts".
- [19] ISO/IEC 9646-2 (1991): "OSI Conformance Testing Methodology and Framework Part 2: Abstract Test Suite Specification".
- [20] ISO/IEC 9646-5 (1991): "OSI Conformance Testing Methodology and Framework Part 5: Requirements on test laboratories and clients for the conformance assessment process".

Page 13, clause 3

Add the following definitions to the definitions clause (clause 3):

Integrated Services Digital Network (ISDN): See CCITT Recommendation I.112 [16], § 2.3, definition 308.

basic access: See CCITT Recommendation Q.9 [17], § 1, definition 1551.

Protocol Implementation Conformance Statement (PICS): See ISO/IEC 9646-1 [18], § 3.4.6.

Page 14, clause 4

Add the following abbreviations to the abbreviations clause (clause 4):

HDLC	High level Data Link Control
IUT	Implementation Under Test
PCTR	Protocol Conformance Test Report
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
RSE	Remote Single layer Embedded
SCS	System Conformance Statement
SCTR	System Conformance Test Report

Page 17, table 1, table entry 3.4.6

Replace the text "<NOTE b) to table 2/I.431 is not relevant>" by the following:

Clause/subclause	Title/comment	Statement
3.4.6	State tables <Replace NOTE b) to table 2/I.431 by the following: NOTE b): The primitives MPH-AI, PH-AI and MPH-DI shall only be issued when the relevant condition persists. The persistency check procedure is defined in table 1/I.431, § 5.9.3.2.3. Add a new NOTE d) to table 3/I.431: NOTE d): The primitives MPH-AI, PH-AI and MPH-DI shall only be issued when the relevant condition persists. The persistency check procedure is defined in table 1/I.431, § 5.9.3.3.3.>	N

Page 18, table 1, table entry 5.3

Add the following text to the end of the table entry for 5.3:

5.4	Jitter In order to limit the impact on the service performance following a loss of clock synchronization, the maximum time for resynchronization to network clock shall be less than 30 seconds, with the frequency deviation applied to the input port limited to ± 1 ppm.	I
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Pages 73 and 74, subclause C.4.4, "Results:"

Replace the text of subclause C.4.4, "Results:" with the following (modifies stimulus 7 and 8 only):

Results: As listed below.

STIMULUS	MONITOR	COMMENT
FRAME B	(see *)	
#	NOF	
/FAS,BIT 2 = 1, /FAS,BIT 2 = 1		
/Fas,BIT 2 = 1	RAI	Initial condition
MF A	NOF	
4 X MF B	RAI	No multiframe alignment
MF A	NOF	
37 X MF B	NOF, transition to RAI and back to NOF (see **)	2 MFAS within 8ms in the limit of 100ms
MF A, MF B, MF A, MFB, MFA, MFB	NOF	
MF B	NOF	
# 251	Stable NOF	No RAI 500ms after a loss of multiframe alignment
/FAS,BIT 2 = 1, /FAS,BIT 2 = 1		
/Fas,BIT 2 = 1	RAI	Initial condition
MF B	NOF	Correct frame alignment but not multiframe alignment
# 250		No multiframe alignment within 500ms
MF B	RAI	
MF A, 4 X MF B	RAI	
MF A, 2 X MF B, MF A		Undefined condition
MF A, 2 X MF B, 2 X MF A	NOF	Multiframe alignment reached
MF B, MF A	NOF	
#		

* This stimulus shall be repeated in order to allow clock synchronisation of the IUT, the time taken to synchronise may be dependant on the implementation.

** RAI or NOF depending on the implementation options described in CCITT Recommendation G.706 [4].

Page 178, addition of new annex F

Add the following annex F to the end of the document:

Annex F (normative): System Conformance Statement (SCS), Protocol Implementation Conformance Statement (PICS) and Protocol Implementation eXtra Information for Testing (PIXIT) for interface points I_a and I_b

Notwithstanding the provisions of the copyright clause related to the text of this ETS, ETSI grants that users of this ETS may freely reproduce the SCS, PICS and PIXIT proforma in this annex so that they can be used for their intended purposes and may further publish the completed SCS, PICS and PIXIT proforma.

F.1 SCS proforma for interface point I_a (TE)

F.1.1 Introduction

A client who requests a conformance test shall provide to the test laboratory a System Conformance Statement (SCS) and a client checklist. The proforma in this clause may be used to present this SCS.

The main purpose of the SCS is to identify the client organization and the test candidate.

The purpose of the client checklist is to provide a record of test-related information.

F.1.2 Proforma structure and content

The proforma consist of the following tables containing pre-printed guide text:

- **client organization:** for identification of the client organization;
- **test candidate:** for identification and itemizing of the test candidate;
- **test status of the test candidate and testing claims:** for indication of the test status of the test candidate, summarizing of the testing claims, provision of references to associated System Conformance Test Report (SCTR) and Protocol Conformance Test Report (PCTR), and specification of the protocols implemented in the test candidate;
- **client checklist:** for provision of a record of test-related information.

F.1.3 Filling in guidance

The pre-printed guide text in the proforma indicates the kind of information to be filled in by the client.

Table F.1

Client organization	
Client name	_____
Street/No.:	_____
Postal code/City:	_____
Country:	_____
Telephone:	_____
Telefax:	_____
Telex:	_____
Teletex:	_____
Client manager	
Name:	_____
Location:	_____
Telephone:	_____
Contact person	
Name:	_____
Location:	_____
Telephone:	_____
Additional information	

Table F.2

Test candidate			
Test candidate identification:			
Name	Model	Version	Serial number
Configuration (identify/describe separate units (e.g. scanner, keyboard, printer, etc.).			

Table F.3

Test status of the test candidate and testing claims			
Layer 1 test status and testing claims			
Answer by Yes(=Y) or No(=N) according to the claims:			
Tested before? (note)	Test wanted?	PCTR wanted?	Log wanted?
NOTE: If "Yes" in the left column "Tested before?", indicate references to existing test documents (if tested at another test laboratory the existing test documents should be made available to the current test laboratory)			
SCTR		PCTR	
Test candidate reference (short identification):			
Layer 1 implementation			
Identify layer 1 component			
Name		Version	
Other information (indicate any other information that may itemize the test candidate or the testing claims):			

Table F.4

Client checklist	
Reference: subclauses/notes of subclause 6.3.1.3 of ISO/IEC 9646-5 [20]. Details may be specified in the appropriate PIXIT(s) and reference(s) to the relevant PIXIT(s) indicated in this checklist.	
Ref. a)	COMPLIANCE WITH ISO/IEC 9646-5 [20] (list exceptions, if any):
Ref. b)	The information (specification of the test candidate, protocols to be tested) is given in tables F.2 and F.3.
Ref. c)	The Remote Single layer Embedded (RSE) test method is used implying that the degree of terminal equipment testability is sufficient.
Ref. d)	Test co-ordination procedures (explain the procedures suitable for use with the test candidate, and which correspond to the RSE test method or indicate references to clauses of manuals etc. giving such explanations):
Ref. NOTE a:	Physical requirements and other practical information (indicate any physical test requirements (space, air conditioning etc.) as well as any other information that may be needed/useful):
Ref. NOTE b:	The information on whom to contact during the conformance assessment process is given in table F.1.

F.2 PICS proforma for interface point I_a (TE)

F.2.1 Introduction

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented for a given protocol. Such a statement is called a PICS. A client who requests a conformance test shall provide to the test laboratory a completed PICS proforma for each layer to be tested.

This clause defines the PICS proforma applying to the OSI layer 1 (physical layer) of equipment having interface I_a (see § 2.2 of CCITT Recommendation I.431 [2]) for the connection to the ISDN primary rate access at reference points T or S/T (coincident S and T) (see CCITT Recommendation I.411 [1]) and intended to be installed on customers premises.

NOTE: In addition to the information provided by a PICS, information relating to the implementation and its testing environment is essential. Such extra information is called a PIXIT. Generally PIXIT proforma are produced and provided by the test laboratory.
The PIXIT proforma provided in clause F.3 should be used.

F.2.2 PICS proforma structure and contents

The PICS proforma consist of tables structured as indicated in references ISO/IEC 9646-1 [18] and ISO/IEC 9646-2 [19].

F.2.3 Pre-printed table contents

The pre-printed contents of the PICS tables provide the following:

- table/item identification, see subclause F.2.4;
- item names or short descriptions;
- references to the standards;
- status attributes specifying the status of the items;
- predicates, see "c" below;
- column to be filled in by the client, see subclause F.2.5.

The status attribute in the "Status" column reflects the conformance requirements defined in the referenced standard as follows:

- | | |
|------------------|---|
| m (mandatory): | the capability is required to be implemented, in conformance with the protocol specification. When a mandatory capability is not supported, it is a case of non-conformance, and the client shall give a justification (see subclause F.2.5). |
| o (optional): | the capability may be implemented, and if it is implemented it is required to conform to the protocol specification. |
| c (conditional): | the requirement on the capability depends on the selection of other optional or conditional items; the PICS proforma cannot define in advance a definite status for the capability, it can only indicate that the status depends on the evaluation of a predicate. The predicates are indicated in the table column "Predicate" or in the last table row as item notes. |
| - (dash): | not applicable item, i.e. no requirement can be expressed in a given context. |

F.2.4 Table/item identification

The PICS table is provided with a table/item identification label pre-printed to the left in the table headers. The labels are composed as follows:

- one capital letter, being the first letter of the layer name;
- a serial number.

Each item in a PICS table is provided with a serial number in the left-hand table column, called "Item No."

To identify an item unambiguously, the table label and the item number are combined by use of a slash character, "/", e.g. in the 2nd table of the Physical layer PICS, the 3rd item is identified by "P2/3".

F.2.5 Filling in guidance

The PICS proforma shall be filled in by the client.

The filling in is done in the rows of right table column named "Support" as follows:

- for implemented items one of: Y, y, Yes, yes or YES is entered;
- for not implemented items one of: N, n, No, no or NO is entered.

For each not implemented mandatory item, a justification shall be given (e.g. as a note added by the client at the relevant PICS page, or as a client statement in the relevant PIXIT in the PIXIT table named "Clients additional information").

Table F.5

P1 Optional capabilities				
Item No.	Item	Reference ETS 300 011	Status	Support
1.A	TE/NT2 has only one user-network interface (note 1).	Table 1, subclause 5.4.3	o	
1.B	TE/NT2 has more than one user-network interface (notes 1, 2).	Table 1, subclause 5.4.3	o	
2.A	TE using interface connector according to ISO/IEC 10173 (note 1).	Table 1, subclause 6	o	
2.B	TE permanently wired to NT (note 1).	Table 1, subclause 6	o	
3	TE designed for PTNX interconnection.	annex A	o	
4	TE designed to act as master: - output frequency accuracy ± 32 ppm.	subclause A.3.1.1	o	
5	Is the TE PTNX with a high clock accuracy class: - output frequency accuracy ± 1 ppm.	subclause A.3.1.1	o	
6	Is the TE designed to be connected to the T reference point only?	Table 1, subclause 5.3	o	
7	Does the TE use bit 2 of frames without frame alignment signal for detection of loss of frame alignment?	Table 4, subclause 4.4.1	o	
NOTE 1: One of the possibilities (separated with dotted line) shall be chosen.				
NOTE 2: If yes, fill in P1/5.				

Table F.6

P2		Timers				
Item No.	Item	Reference ETS 300 011	Status	Support	Range/value	
					Allowed	Supported
1	The persistent receipt of signals other than normal frames verified by timer T1.	Table 1, subclauses 5.9.3.2.3 and 5.9.3.3.3	m		100 - 1000 ms	
2	The persistent receipt of normal frames verified by timer T2.	Table 1, subclauses 5.9.3.2.3 and 5.9.3.3.3	m		10 - 100 ms	
3	Timer for recognition of the persistent receipt of A bit set to 1 (RAI) and E bit set to 0 (CRC4 error).	Table 1, subclause 3.4.1	m		10 - 50 ms	
4	Timer for recognition of loss of signal.	Table 1, subclause 3.4.1	m		> 1 ms	

Table F.7

P3		Functional characteristics			
Item No.	Item	Reference ETS 300 011	Status	Support	
1	Only point-to-point configuration.	Table 1, subclause 2.1	m		
2	Layer 1 functions: B-channel or H ₀ -channel or H ₁₁ -channel or H ₁₂ -channel, D-channel. bit timing, octet timing, frame alignment, power feeding, maintenance and CRC procedure.	Table 1, subclause 3.1	m		
3	Two interchange circuits for transmission of digital signals.	Table 1, subclause 3.2	m		
4	Power feeding via the interface.	Table 1, subclause 3.2	o		
5	Definition of signals between the network and user sides: <ul style="list-style-type: none"> - normal operational frames; - RAI remote alarm indication; - LOS no received signal; - AIS alarm indication signal; - CRC error information. 	Table 1, subclause 3.4.1	m		
6	Definitions of states at user sides: <ul style="list-style-type: none"> - F0 state: Loss of power on users side; - F1 state: Operational state; - F2 state: Reception of RAI; - F3 state: Loss of signal or frame alignment; - F4 state: Reception of AIS; - F5 state: Reception of RAI and continuous CRC error report; - F6 state: Power on state. 	Table 1, subclauses 3.4.2 and 3.4.3	m		
7	Definitions of primitives: <ul style="list-style-type: none"> - PH-AI Activate indication; - PH-DI Deactivate indication; - MPH-AI Management activate indication; - MPH-DI Management deactivate indication. 	Table 1, subclause 3.4.5	m		
8	Operational functions as defined in state tables for user side.	Table 1, subclause 3.4.6 Table 2/I.431	m		

Table F.8

P4 Electrical characteristics				
Item No.	Item	Reference ETS 300 011	Status	Support
1	Electrical interface: balanced 120 ohm (symmetric pair).	Table 1, subclause 5.1	m	
2.A	Bit rate is 2 048 kbit/s \pm 1 ppm (note) (TE PTNX with a high clock accuracy class).	subclause A.3.1.1	c P1/5	
2.B	Bit rate is 2 048 kbit/s \pm 32 ppm (note) (PTNX interconnection).	subclause A.3.1.1	c P1/3	
2.C	Bit rate is 2 048 kbit/s \pm 50 ppm (note) (all others).	Table 2, subclause 6.1	c	
3.A	Is the TE able to synchronize to 2 048 kbit/s \pm 1 ppm? (TE PTNX with a high clock accuracy class).	subclause A.3.1.1	c P1/5	
3.B	Is the TE able to synchronize to 2 048 kbit/s \pm 5 ppm? (TE connected to T reference point only).	Table 1, subclause 5.3	c P1/6	
3.C	Is the TE able to synchronize to 2 048 kbit/s \pm 32 ppm? (PTNX interconnection).	subclause A.3.1.1	c P1/4	
4	AIS recognition Bit rate is 2 048 kbit/s \pm 32 ppm.	Table 2, subclause 6.1	m	
5	Code is HDB3.	Table 2, subclause 6.1 annex A/G.703	m	
6	Pulse shape.	G.703, Fig. 15	m	
7	Nominal peak voltage: 3 V, peak voltage of a space: $0 \pm 0,3$ V, nominal pulse width: 244 ns. Ratio of the amplitudes of positive and negative pulses at the centre of pulse interval: 0,95 to 1,05. Ratio of the widths of positive and negative pulses at the nominal half amplitude: 0,95 to 1,05.	Table 2, subclause 6.2	m	
8	Return loss at the input port: - 51 kHz \leq f < 102 kHz return loss > 12 dB; - 102 kHz \leq f \leq 2 048 kHz return loss > 18 dB; - 2 048 kHz < f \leq 3 072 kHz return loss > 14 dB.	Table 2, subclause 6.3.3	m	
9	Input port immunity against reflections: - signal to interference ratio 18 dB.	Table 2, subclause 6.3.4	m	
10	Eight bits per time slot.	Table 1, subclause 5.2.1	m	
11	32 time slots per frame.	Table 1, subclause 5.2.2	m	
12	Assignments of bits in time slot 0, frame alignment signal, CRC4 multiframe alignment signal, CRC4-bits, CRC4 error information.	Table 1, subclauses 5.2.3 and 5.2.4.1 Table 3, subclause 2.3.2	m	
13	Time slot 16 is assigned to the D-channel.	Table 1, subclause 5.2.4.2	m	
14	Assignment of channels (B or H ₀ or H ₁₁ or H ₁₂).	Table 1, subclause 5.2.4.3	m	
15	Independent transmission provided by the time slots.	Table 1, subclause 5.2.4.4	m	
16	The TE synchronizes its timing from the signal received.	Table 1, subclause 5.3	m	
17	TE with more than one user network interface shall have the ability to synchronize its clock to more than one access.	Table 2, subclause 6.1	c P1/1.B	
18.A	TE Input Jitter Tolerance: Minimum tolerance to jitter and wander (note).	Table 1, subclause 5.4.2 Figure 7/l.431	c	
18.B	Tolerable jitter at the inputs (PTNX interconnection) (note).	subclause A.3.1.1	c P1/3	
19.A	TE Output Jitter: only one user-network interface (note): - low - high cut-off = 20 Hz - 100 kHz: max. jitter = 1,1 UI; - low - high cut-off = 400 Hz - 100 kHz: max. jitter = 0,11 UI.	Table 1, subclause 5.4.3.1	c P1/1.A	

(continued)

Table F.8 (concluded)

P4 Electrical characteristics				
Item No.	Item	Reference ETS 300 011	Status	Support
19.B	More than one user-network interface (note): - low - high cut-off = 4 Hz - 100 kHz: max. jitter = 1,1 UI; - low - high cut-off = 40 Hz - 100 kHz: max. jitter = 0,11 UI.	Table 1, subclause 5.4.3.2	c P1/1.B	
19.C	PTNX interconnection (note): - low - high cut-off = 4 Hz - 100 kHz: max. jitter = 1,6 UI; - low - high cut-off = 40 Hz - 100 kHz: max. jitter = 0,11 UI.	subclause A.3.1.1	c P1/3	
20	Tolerable longitudinal voltage: - input longitudinal voltage $V_l \leq 2 V_{rms}$ for $10 \text{ Hz} \leq f \leq 30 \text{ MHz}$.	Table 1, subclause 5.5	m	
21	Impedance towards ground (receiver and transmitter): - $10 \text{ Hz} < f \leq 1 \text{ MHz}$: $R < 1000 \text{ ohm}$.	Table 1, subclause 5.7	m	
NOTE: One of the possibilities (separated with dotted lines) shall be chosen according to the answers given in table F.5.				

Table F.9

P5 Interface procedures				
Item No.	Item	Reference ETS 300 011	Status	Support
1	Codes for idle time slots: - pattern including at least three binary one's.	Table 1, subclause 5.8.1	m	
2	HDLC flags to be transmitted when layer 2 has no frames to send.	Table 1, subclause 5.8.2	m	
3	Loss of frame alignment: - reception of three consecutive incorrect frame alignment signals.	Table 4, subclause 4.1.1	m	
4	Strategy for frame alignment recovery: - detection of correct frame alignment signal in frame n; - detection of bit 2 = 1 in frame n+1; - detection of correct frame alignment signal in frame n+2.	Table 4, subclause 4.1.2	m	
5	CRC multiframe alignment: - detection of two valid CRC multiframe alignment signal within 8 ms.	Table 4, subclause 4.2	m	
6	CRC bit monitoring.	Table 4, subclause 4.3	m	
7	Monitoring procedure.	Table 4, subclause 4.3.1	m	
8	Monitoring for false frame alignment: - Detection of 915 or more errored CRC block's out of 1 000 indicates false frame alignment.	Table 4, subclause 4.3.2	m	

Table F.10

P6 Maintenance of the interface				
Item No.	Item	Reference ETS 300 011	Status	Support
1	Definition of maintenance signals: - RAI, indicates loss of layer 1 capability at user-network interface, RAI is transmitted in the opposite direction of the error; - AIS, indicates loss of layer 1 capability in the ET-to-TE direction of the user-network interface; - CRC, error report: E bit.	Table 1, subclause 5.9.1	m	
2	CRC procedure. Special use of bit 1 of the frame: - Bit 1 is used for cyclic redundancy check-4.	Table 1, subclause 5.9.2.1 Table 3, subclause 2.3.3.1	m	
3	Allocation of bit 1 to 8 of the frame for a complete CRC-4 multiframe.	Table 3, subclause 2.3.3.2 Table 4b/G.704	m	
4	CRC-4 multiframe structure.	Table 3, subclause 2.3.3.3	m	
5	Use of bit 1 in CRC-4 multiframe.	Table 3, subclause 2.3.3.4	m	
6	Multiplication/division process.	Table 3, subclause 2.3.3.5. 1	m	
7	Encoding procedure.	Table 3, subclause 2.3.3.5. 2	m	
8	Decoding procedure.	Table 3, subclause 2.3.3.5. 3	m	
9	General requirements: - detect anomalies; - detect defects; - take action when anomalies or/and defects are detected; - detect received defect indication signals.	Table 1, subclause 5.9.3.1	m	
10	Maintenance functions on the user side, anomalies and defects detection: - loss of power; - loss of incoming signal; - loss of frame alignment; - CRC error.	Table 1, subclause 5.9.3.2. 1	m	
11	Detection of defect indication signals on the user side: - RAI; - AIS.	Table 1, subclause 5.9.3.2. 2	m	
12	Consequent actions on the user side (see table F.6 concerning the timers.	Table 1, subclause 5.9.3.2. 3	m	

Table F.11

P7 Power feeding				
Item No.	Item	Reference ETS 300 011	Status	Support
1	Power feeding requirements for feeding NT1s.	Table 1, clause 8	o	
2	Provision of power to the NT1 via Ia.	Table 1, subclause 8.1	o	
3	Power available at the NT1 - Power \geq 7 Watt.	Table 1, subclause 8.2	o	
4	Voltage at the input of the NT1 - $-57V \leq U \leq -20V$.	Table 1, subclause 8.3	o	
5	Safety requirements: - protection against short circuits and overload; - no damage of power sink with interchange of wires.	Table 1, subclause 8.4	o	

Table F.12

P8 Conformance				
Item No.	Item	Reference ETS 300 011	Status	Support
1	Transparent loopback of at least 1 time slot towards the interface (note 1).	annex C, subclause C.1.2.1	o	
2	Ability to transmit a PRBS $2^{11}-1$ in a time slot (note 2).	annex C, subclause C.1.2.1	o	
NOTE 1: If yes, fill in P1/3.				
NOTE 2: If yes, fill in P1/4.				

F.3 PIXIT proforma for interface point I_a (TE)

F.3.1 Introduction

In order to test a protocol implementation, information relating to the implementation and its testing environment in addition to that provided by the PICS is essential. Such extra information is called a Protocol Implementation eXtra Information for Testing (PIXIT). A client who requests a conformance test shall provide to the test laboratory a completed PIXIT proforma for each layer to be tested.

The proforma provided in table F.14 shall be used.

F.3.2 Proforma structure and contents

The PIXIT proforma are tables containing pre-printed guide text and empty table space intended to be used by the client for explanations, specification of details etc.

The proforma given in table F.13 is intended for client indication of the environmental conditions to be used during testing, and test limitations, if any. Note, that in case no environmental value or range is indicated by the client, the test laboratory will use a value within the ranges pre-printed in the proforma.

F.3.3 Table / item identification

Corresponding to the PICS tables, each PIXIT table is provided with an identification label pre-printed to the left in the tables headers. In order to distinguish between PICS and PIXIT identifications, an X is added to the prefix letter. The PIXIT labels are composed as follows:

- two capital letters being the first letter of the layer name and the additional X;
- a serial number.

Each pre-printed item in a PIXIT table is provided with a serial number in the left hand tables column called "Item No."

To identify a PIXIT item unambiguously, the table label and item number are combined using a slash character, "/", e.g. in the 1st table of the Physical layer PIXIT, the 3rd item is identified by "PX1/3".

F.3.4 Filling in guidance

The PIXIT proforma shall be filled in by the client. The filling in is done according to the pre-printed guide text in the tables indicating the kind of information to be entered.

In order to reduce the test time, it is essential not only that the required explanations, specifications etc. are detailed but also that conditions which cannot be predetermined are explained/specified in details (using empty table space, additional pages or giving references to manuals etc.).

The information provided in a PIXIT shall not conflict with information provided in the corresponding PICS or with the requirements of the standards.

Table F.13

Environmental test conditions and test limitations				
TEST CANDIDATE REFERENCE (short identification; for full identification see table F.2)				
Environmental test conditions (indicate the conditions to be used during testing):				
Ambient temperature (range)	Relative humidity range	Air pressure range	Power supply	
			Voltage	Frequency
°C	%	kPa	V ± %	Hz ± %
If no values / ranges are indicated above by the client, the Implementation Under Test (IUT) will be tested under the following conditions				
15 - 35 °C	25 - 75 %	86 - 106 kPa	within ± 5 % of normal operating voltage	within ± 4 % of normal operating frequency
OTHER TEST CONDITIONS (indicate any other condition that may be needed / useful during testing):				
TEST LIMITATIONS (explain if any of the abstract tests cannot be executed because of non implementation of Abstract Layer Primitives etc.):				

Table F.14

PX1 Means of control and observation and test co-ordination procedures etc.			
Item No.	Reference to PICS	ITEM	Answer below if relevant or make reference to table PX2
1		Is the power supply an integrated part of the TE?	
2		How is the information about the status indication (the states F0 - F6) presented?	
3		Can a loopback be established? If yes, describe how to do it and describe which time-slot(s) can be looped backed.	
4		Does the TE support leased line interface or user to user interface? (PTNX interconnection).	
5		Is the TE user/network interface at the S reference point?	
6		Is the TE user/network interface at the T reference point?	
7		Does the TE have the ability to transmit a PRBS2 ¹¹ - 1 in a time-slot? If yes, describe how to establish it.	
8		Has the TE more than one access? If yes, how many and from which of the accesses can the TE take its synchronization	
9		What is the setup time for the TE?	

Table F.15

PX2 Clients additional information	

F.4 SCS proforma for interface point I_b (NT)

F.4.1 Introduction

A client who requests a conformance test shall provide to the test laboratory a SCS and a client checklist. The proforma in this clause may be used to present this SCS.

The main purpose of the SCS is to identify the client organization and the test candidate.

The purpose of the client checklist is to provide a record of test-related information.

F.4.2 Proforma structure and content

The proforma consist of the following tables containing pre-printed guide text:

- **client organization:** for identification of the client organization;
- **test candidate:** for identification and itemizing of the test candidate;
- **test status of the test candidate and testing claims:** for indication of the test status of the test candidate, summarizing of the testing claims, provision of references to associated System Conformance Test Report (SCTR) and Protocol Conformance Test Report (PCTR), and specification of the protocols implemented in the test candidate;
- **client checklist:** for provision of a record of test-related information.

F.4.3 Filling in guidance

The pre-printed guide text in the proforma indicates the kind of information to be filled in by the client.

Table F.16

Client organization	
Client name	
Street/No.:	
Postal code/City:	
Country:	
Telephone:	
Telefax:	
Telex:	
Teletex:	
Client manager	
Name:	
Location:	
Telephone:	
Contact person	
Name:	
Location:	
Telephone:	
Additional information	

Table F.17

Test candidate			
Test candidate identification:			
Name	Model	Version	Serial number
Configuration (identify/describe separate units (e.g. scanner, keyboard, printer, etc.).			

Table F.18

Test status of the test candidate and testing claims			
Layer 1 test status and testing claims			
Answer by Yes(=Y) or No(=N) according to the claims:			
Tested before? (note)	Test wanted?	PCTR wanted?	Log wanted?
NOTE: If "Yes" in the left column "Tested before?", indicate references to existing test documents (if tested at another test laboratory the existing test documents should be made available to the current test laboratory).			
SCTR		PCTR	
Test candidate reference (short identification):			
Layer 1 implementation			
Identify layer 1 component			
Name		Version	
Other information (indicate any other information that may itemize the test candidate or the testing claims):			

Table F.19

Client checklist	
Reference: sections/notes of section 6.3.1.3 of ISO/IEC 9646-5 [20]. Details may be specified in the appropriate PIXIT(s) and reference(s) to the relevant PIXIT(s) indicated in this checklist.	
Ref. a)	COMPLIANCE WITH ISO/IEC 9646-5 [20] (list exceptions, if any):
Ref. b)	The information (specification of the test candidate, protocols to be tested) is given in tables F.17 and F.18.
Ref. c)	The Remote Single layer Embedded (RSE) test method is used implying that the degree of terminal equipment testability is sufficient.
Ref. d)	Test co-ordination procedures (explain the procedures suitable for use with the test candidate, and which correspond to the RSE test method or indicate references to clauses of manuals etc. giving such explanations):
Ref. NOTE a:	Physical requirements and other practical information (indicate any physical test requirements (space, air conditioning etc.) as well as any other information that may be needed/useful):
Ref. NOTE b:	The information on whom to contact during the conformance assessment process is given in table F.16.

F.5 PICS proforma for interface point I_b (NT)

F.5.1 Introduction

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented for a given protocol. Such a statement is called a PICS. A client who requests a conformance test shall provide to the test laboratory a completed PICS proforma for each layer to be tested.

This clause defines the PICS proforma applying to the OSI layer 1 (physical layer) of equipment having interface I_b (see § 2.2 of CCITT Recommendation I.431 [2]) for the connection to the ISDN primary rate access at reference points T or S/T (coincident S and T) (see CCITT Recommendation I.411 [1]) and intended to be installed on customers premises.

NOTE: In addition to the information provided by a PICS, information relating to the implementation and its testing environment is essential. Such extra information is called a PIXIT. Generally PIXIT proforma are produced and provided by the test laboratory.
The PIXIT proforma provided in clause F.6 should be used.

F.5.2 PICS proforma structure and contents

The PICS proforma consist of tables containing pre-printed text and structured as indicated in ISO/IEC 9646-1 [18] and ISO/IEC 9646-5 [20].

F.5.3 Pre-printed table contents

The pre-printed contents of the PICS tables provide the following:

- table/item identification, see subclause F.5.4;
- item names or short descriptions;
- references to the standards;
- status attributes specifying the status of the items;
- predicate, see "c" below;
- column to be filled in by the client, see subclause F.5.5.

The status attribute in the "STATUS" column reflects the conformance requirements defined in the referenced standard as follows:

- | | |
|------------------|---|
| m (mandatory): | the capability is required to be implemented, in conformance with the protocol specification. When a mandatory capability is not supported, it is a case of non-conformance, and the client shall give a justification (see subclause F.5.5). |
| o (optional): | the capability may be implemented, and if it is implemented it is required to conform to the protocol specification. |
| c (conditional): | the requirement on the capability depends on the selection of other optional or conditional items; the PICS proforma cannot define in advance a definite status for the capability, it can only indicate that the status depends on the evaluation of a predicate. The predicates are indicated in the table column "Predicate" or in the last table row as item notes. |
| - (dash): | not applicable item, i.e. no requirement can be expressed in a given context. |

F.5.4 Table/item identification

Each PICS table is provided with an identification label pre-printed to the left in the table headers. The label is composed as follows:

- one capital letter being the first letter of the layer name;
- a serial number.

To identify an item unambiguously, the table label and the item number are combined by use of a slash character, "/", e.g. the third item in the second table of the Physical layer PICS, is identified by "P2/3".

F.5.5 Filling in guidance

For each layer to be tested, the associated PICS proforma shall be filled in by the client.

The filling in is done in the rows of the table column named "Support" as follows:

- for implemented items one of: Y, y, Yes, yes or YES is entered;
- for not implemented items one of: N, n, No, no or NO is entered.

For each not implemented mandatory item, a justification shall be given (e.g. as a note added by the client at the relevant PICS page, or as a client statement in the relevant PIXIT in table F.27).

Table F.20

P1 Optional capabilities				
Item No.	ITEM	Reference ETS 300 011	Status	Support
1.A	Is the network termination of type 1 (NT1)? (notes 1, 2)	clause 3	o	
1.B	Is the network termination of type 2 (NT2)? (note 1)	clause 3	o	
2.A	Is the NT using interface connector according to ISO/IEC 10173? (note 1)	Table 1, clause 6	o	
2.B	Is the NT hardwired to TE? (note 1)	Table 1, clause 6	o	
3	Is the NT powered via the interface?	Table 1, subclause 8.1	o	
4	Does the NT use bit 2 frames not containing frame alignment signal to detect loss of frame alignment?	Table 4, subclause 4.1.1	o	
5	Does the digital transmission link process CRC 4?	subclause 5.9.2.2	c	P1/1.A

NOTE 1: One of the possibilities (separated with dotted line) shall be chosen.

NOTE 2: The network side of the interface at the T reference point covers the NT1, LT and ET functions.

Table F.21

P2 Timers						
Item No.	ITEM	Reference ETS 300 011	Status	Support	Range/value	
					Allowed	Supported
1	The persistent receipt of signals other than normal frames verified by timer T1.	Table 1, subclauses 5.9.3.2.3 and 5.9.3.3.3	m		100 - 1000 ms	
2	The persistent receipt of normal frames verified by timer T2.	Table 1, subclauses 5.9.3.2.3 and 5.9.3.3.3	m		10 - 100 ms	
3	Timer for recognition of the persistent receipt of A bit set to 1 (RAI) and E bit set to 0 (CRC4 error).	Table 1, subclause 3.4.1	m		10 - 50 ms	
4	Timer for recognition of loss of signal.	Table 1, subclause 3.4.1	m		> 1 ms	

Table F.22

P3 Functional characteristics				
Item No.	ITEM	Reference ETS 300 011	Status	Support
2	Only point-to-point configuration.	Table 1, subclause 2.1	m	
3	Layer 1 functions: B-channel or H ₀ -channel or H ₁₁ -channel or H ₁₂ -channel, D-channel. Bit timing, Octet timing, Frame alignment, Power feeding, maintenance and CRC procedure.	Table 1, subclause 3.1	m	
4	Two interchange circuits for transmission of digital signals.	Table 1, subclause 3.2	m	
5	Power feeding via the interface.	Table 1, subclause 3.2	c P1/3	
6	Definition of signals between the network and user side: - Normal operational frames; - RAI remote alarm indication; - LOS no received signal; - AIS alarm indication signal; - CRC error information.	Table 1, subclause 3.4.1	m	
7	Definitions of states at network side: - G0 state: Loss of NT power; - G1 state: Operational state; - G2 state: Transmitting RAI; - G3 state: Loss timing at network side; - G4 state: Transmitting AIS; - G5 state: Transmitting RAI and continuous CRC error report; - G6 state: Power on state.	Table 1, subclauses 3.4.2 and 3.4.3	m m m m m c (note) m	
8	Definitions of primitives: - PH-AI Activate indication; - PH-DI Deactivate indication; - MPH-AI Management activate indication; - MPH-DI Management deactivate indication.	Table 1, subclause 3.4.5	m	
9	Operational functions as defined in state tables for network side.	Table 1, subclause 3.4.6 Table 2/I.431	m	
NOTE: This requirement is mandatory if P1/5 is true, and it is not applicable if P1/5 is not true.				

Table F.23

P4 Electrical characteristics				
Item No.	ITEM	Reference ETS 300 011	Status	Support
1	Electrical Interface: Balanced 120 ohm (symmetric pair).	Table 1, subclause 5.1	m	
2	Bit rate is 2 048 kbit/s \pm 50 ppm in free-running mode.	Table 2, subclause 6.1	m	
3	Code is HDB3.	Table 2, subclause 6.1 annex A/G.703	m	
4	Pulse shape.	G.703, Fig. 15	m	
5	Nominal peak voltage: 3V, peak voltage of a space: 0 +/- 0,3V, nominal pulse width: 244 ns. Ratio of the amplitudes of positive and negative pulses at the centre of pulse interval: 0,95 to 1,05. Ratio of the widths of positive and negative pulses at the nominal half amplitude: 0,95 to 1,05.	Table 2, subclause 6.2	m	
6	Return loss at the input port: - 51 kHz \leq f < 102 kHz return loss > 12 dB; - 102 kHz \leq f \leq 2 048 kHz return loss > 18 dB; - 2 048 kHz < f \leq 3 072 kHz return loss > 14 dB.	Table 2, subclause 6.3.3	m	
7	Input port immunity against reflections: - Signal to interference ratio 18 dB.	Table 2, subclause 6.3.4	m	
8	Eight bits per time slot.	Table 1, subclause 5.2.1	m	
9	32 time slots per frame.	Table 1, subclause 5.2.2	m	
10	Assignments of bits in time slot 0, frame alignment signal.	Table 1, subclauses 5.2.3 and 5.2.4.1 Table 3, subclause 2.3.2		
11	Assignments of bits in time slot 0, frame alignment signal, CRC4 multiframe alignment signal, CRC4-bit's, CRC4 error bits.	Table 1, subclauses 5.2.3 and 5.2.4.1 Table 3, subclause 2.3.2	m	
12	Time slot 16 is assigned to the D-channel.	Table 1, subclause 5.2.4.2	m	
13	Assignment of channels (B or H ₀ or H ₁₁ or H ₁₂).	Table 1, subclause 5.2.4.3	m	
14	Independent transmission provided by the time slots.	Table 1, subclause 5.2.4.4	m	
15	The NT synchronizes its timing to the network clock.	Table 1, subclause 5.3	m	
16	NT input jitter tolerance: minimum tolerance to jitter and wander.	Table 1, subclause 5.4.2 Figure 7/I.431	m	
17	NT output jitter: - low - high cut-off = 20 Hz - 100 kHz: max. jitter = 1,1 UI; - low - high cut-off = 400 Hz - 100 kHz: max. jitter = 0,11 UI.	Table 1, subclause 5.4.3.1	m	
18	Tolerable longitudinal voltage: - input longitudinal voltage $V_l \leq 2 V_{rms}$ for 10 Hz \leq f \leq 30 MHz.	Table 1, subclause 5.5	m	
19	Impedance towards ground (receiver and transmitter): - 10 Hz < f \leq 1 MHz: R > 1 000 ohm.	Table 1, subclause 5.7	m	

Table F.24

P5 Interface procedures				
Item No.	ITEM	Reference ETS 300 011	Status	Support
1	Codes for idle time slots: - pattern including at least three binary one's.	Table 1, subclause 5.8.1	m	
2	HDLC flags to be transmitted when layer 2 has no frames to send.	Table 1, subclause 5.8.2	m	
3	Loss of frame alignment.	Table 4, subclause 4.1.1	m	
4	Strategy for frame alignment recovery.	Table 4 subclause 4.1.2	m	
5	CRC multiframe alignment.	Table 4 subclause 4.2	m	
6	CRC bit monitoring.	Table 4 subclause 4.3	m	
7	Monitoring procedure.	Table 4 subclause 4.3.1	m	
8	Monitoring for false frame alignment.	Table 4 subclause 4.3.2	m	

Table F.25

P6 Maintenance of the interface				
Item No.	ITE	Reference ETS 300 011	Status	Support
1	Definition of maintenance signals - RAI, indicates loss of layer 1 capability at user-network interface, RAI is transmitted in the opposite direction of the error - AIS, indicates loss of layer 1 capability in the ET-to-TE direction of the user-network interface - CRC, error report: E bit	Table 1 subclause 5.9.1	m	
2	CRC procedure Special use of bit 1 of the frame - Bit 1 is used for cyclic redundancy check-4	Table 1 subclause 5.9.2.1 Table 3 subclause 2.3.3.1	m	
3	Allocation of bit 1 to 8 of the frame for a complete CRC-4 multiframe.	Table 3 subclause 2.3.3.2 Table 4b/G.704	m	
4	CRC-4 multiframe structure.	Table 3 subclause 2.3.3.3	m	
5	Use of bit 1 in CRC-4 multiframe.	Table 3 subclause 2.3.3.4	m	
6	Multiplication/division process.	Table 3, subclause 2.3.3.5. 1	m	
7	Encoding procedure.	Table 3, subclause 2.3.3.5. 2	m	
8	Decoding procedure.	Table 3, subclause 2.3.3.5. 3	m	
9	General requirements: - detect anomalies; - detect defects; - take action when anomalies or/and defects are detected; - detect received defect indication signals.	Table 1, subclause 5.9.3.1	m	
10	Maintenance functions on the user side, anomalies and defects detection: - loss of power; - loss of incoming signal; - loss of frame alignment; - CRC error.	Table 1, subclause 5.9.3.2. 1	m	
11	Detection of defect indication signals on the user side: - RAI; - AIS.	Table 1, subclause 5.9.3.2. 2	m	
12	Consequent actions on the user side (see table P2 concerning the timers. (note)	Table 1, subclause 5.9.3.2. 3	m	

NOTE: The consequent action on loss of signal and loss of frame alignment depends on P1/5. Refer to P3/7 for details.

Table F.26

P7 Power feeding				
Item No.	ITEM	Reference ETS 300 011	Status	Support
1	Provision of power to the NT via lb.	Table 1, subclause 8.1	c P1/1.A and P1/3	
2	Power consumption of the NT: - power \leq 7 Watt.	Table 1, subclause 8.2	c P7/1	
3	Voltage required by the NT - $-57 \text{ V} \leq U \leq -20 \text{ V}$.	Table 1, subclause 8.3	c P7/1	
4	Safety requirements: - no damage of power sink with interchange of wires.	Table 1, subclause 8.4	c P7/1	

F.6 PIXIT proforma for interface point Ib (NT)

F.6.1 Introduction

In order to test a protocol implementation, information relating to the implementation and its testing environment in addition to that provided by the PICS is essential. Such extra information is called Protocol Implementation eXtra Information for Testing (PIXIT). A client who requests a conformance test shall provide to the test laboratory a completed PIXIT proforma for each layer to be tested.

The proforma provided in table F.27 shall be used.

F.6.2 Proforma structure and contents

The PIXIT proforma are tables containing pre-printed guide text and empty table space intended to be used by the client for explanations, specification of details etc.

The proforma given in table F.13 is intended for client indication of the environmental conditions to be used during testing, and test limitations, if any. Note, that in case no environmental value or range is indicated by the client, the test laboratory will use a value within the ranges pre-printed in the proforma.

F.6.3 Table / item identification

Corresponding to the PICS tables, each PIXIT table is provided with an identification label pre-printed to the left in the tables headers. In order to distinguish between PICS and PIXIT identifications, an X is added to the prefix letter. The PIXIT labels are composed as follows:

- two capital letters being the first letter of the layer name and the additional X;
- a serial number.

Each pre-printed item in a PIXIT table is provided with a serial number in the left hand tables column called "Item No."

To identify a PIXIT item unambiguously, the table label and item number are combined using a slash character, "/", e.g. in the 1st table of the Physical layer PIXIT, the 3rd item is identified by "PX1/3".

F.6.4 Filling in guidance

The PIXIT proforma shall be filled in by the client. The filling in is done according to the pre-printed guide text in the tables.

In order to reduce the test time, it is essential not only that the required explanations, specifications etc. are detailed but also that conditions which cannot be predetermined are explained/specified in details (using empty table space, additional pages or giving references to manuals, etc.).

The information provided in a PIXIT shall not conflict with information provided in the corresponding PICS or with the requirements of the standards.

Table F.27

PX1 Means of control and observation and test co-ordination procedures etc.			
Item No.	Reference to PICS	ITEM	Answer below if relevant or make reference to table PX2
1		How is the information about the status indication (the states G0 - G5) presented?	
2		If the NT has the ability to loopback one or more time slots, describe how the loop is established.	
3		Is the NT user-network interface at the S reference point?	
4		Is the NT user-network interface at the T reference point?	
5		If the NT has the ability to transmit a PRBS $2^{11} - 1$ in a time slot, describe how to establish it.	
6		What is the setup time at power on for the NT?	

Table F.28

PX2 Clients additional information	

History

Document history	
April 1992	First Edition
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May 1995	Unified Approval Procedure UAP 29: 1995-05-22 to 1995-09-15
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