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Integrated Services Digital Network (ISDN);
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Part 7: Abstract Test Suite specification (ATS) for interface I$_B$

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Contents

Foreword

This second edition European Telecommunication Standard (ETS) has been produced by the ETSI Technical Committee Transmission and Multiplexing (TM).

This ETS concerns the basic User Network Interface (UNI) for the Integrated Services Digital Network (ISDN) and consists of 7 parts as follows:

Part 1:   "Layer 1 specification";

Part 2:   "Implementation Conformance Statement (ICS) and Implementation eXtra Information for Testing (IXIT) specification for interface I_A";

Part 3:   "Implementation Conformance Statement (ICS) and Implementation eXtra Information for Testing (IXIT) specification for interface I_B";

Part 4:   "Conformance test specification for interface I_A";

Part 5:   "Conformance test specification for interface I_B";

Part 6:   "Abstract Test Suite (ATS) specification for interface I_A";

Part 7:   "Abstract Test Suite (ATS) specification for interface I_B";

and is based on ITU-T Recommendation I.430 [12].

Transposition dates	
Date of adoption of this ETS:	18 September 1998
Date of latest announcement of this ETS (doa):	31 January 1999
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Date of withdrawal of any conflicting National Standard (dow):	31 July 1999

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1 Scope

This part 7 of ETS 300 012 specifies the Abstract Test Suite (ATS) for the user side of the T reference point or coincident S and T reference point (as defined in CCITT Recommendation I.411 [9]) of implementations conforming to ETS 300 012-1 [1] for the pan-European Integrated Services Digital Network (ISDN).

A further part of this ETS specifies the Test Suite Structure and Test Purposes (TSS&TP) related to this ATS.

2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1]   ETS 300 012-1 (1996): "Integrated Services Digital Network (ISDN); Basic User Network Interface (UNI); Part 1: Layer 1 specification".

[2]   ETS 300 012-2 (1996): "Integrated Services Digital Network (ISDN); Basic User Network Interface (UNI); Part 2: Implementation Conformance Statement (ICS) and Implementation eXtra Information for Testing (IXIT) specification for interface I_A".

[3]   ETS 300 012-3 (1996): "Integrated Services Digital Network (ISDN); Basic User Network Interface (UNI); Part 3: Implementation Conformance Statement (ICS) and Implementation eXtra Information for Testing (IXIT) specification for interface I_B".

[4]   ISO/IEC 9646-1 (1994):   "Information   technology;   Open   Systems Interconnection; Conformance testing methodology and framework; Part 1: General concepts".

[5]   ISO/IEC 9646-2 (1994):   "Information   technology;   Open   Systems Interconnection; Conformance testing methodology and framework; Part 2: Abstract test suite specification".

[6]   ISO/IEC 9646-3 (1992):   "Information   technology;   Open   Systems Interconnection; Conformance testing methodology and framework; Part 3: The Tree and Tabular Combined Notation (TTCN)".

[7]   ISO/IEC 9646-4 (1994):   "Information   technology;   Open   Systems Interconnection; Conformance testing methodology and framework; Part 4: Test realization".

[8]   ISO/IEC 9646-5 (1994):   "Information   technology;   Open   Systems Interconnection; Conformance Testing Methodology and Framework; Part 5: Requirements on test laboratories and clients for the conformance assessment process".

[9]   ITU-T   Recommendation   I.411 (1993):   "ISDN   user-network   interfaces; references configurations".

[10]   ITU-T Recommendation I.112 (1993): "Vocabulary of terms for ISDNs".

[11]   CCITT Recommendation E.164 (1991): "Numbering plan for the ISDN era".

[12]   ITU-T Recommendation I.430 (1995): "Basic user-network interface; Layer 1 specification".

3 Definitions and abbreviations

3.1 Definitions

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

Implementation Under Test (IUT): See ISO/IEC 9646-1 [4].

System Under Test (SUT): See ISO/IEC 9646-1 [4].

Abstract Test Suite (ATS): See ISO/IEC 9646-1 [4].

Protocol Implementation Conformance Statement (PICS): See ISO/IEC 9646-1 [4].

PICS proforma: See ISO/IEC 9646-1 [4].

Lower Tester (LT): See ISO/IEC 9646-1 [4].

Upper Tester (UT): See ISO/IEC 9646-1 [4].

**Point of Control and Observation (PCO):** See ISO/IEC 9646-1 [4].

3.2 Abbreviations

For the purposes of this ETS, the following abbreviations apply, in addition to those given in ETS 300 012-1 [1]:

ASP	Abstract Service Primitive
ATM	Abstract Test Method
ATS	Abstract Test Suite
ExTS	Executable Test Suite
ISO	International Organization for Standardization
IUT	Implementation Under Test
LT	Lower Tester
MOT	Means Of Testing
PCO	Point of Control and Observation
PCTR	Protocol Conformance Test Report
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
SCTR	System Conformance Test Report
SUT	System Under Test
TCP	Test Co-ordination Procedures
TP	Test Purpose
TSS&TP	Test Suite Structure and Test Purposes
TTCN	Tree and Tabular Combined Notation

4 Abstract Test Method (ATM)

The remote test method is applied for this ATS. The boundary between layer 1 and layer 2 is supposed to be inaccessible. This means that the correct interaction between the Implementation Under Test (IUT) and its upper layer on the one hand, and the management entity on the other hand, is not directly testable. The Points of Control and Observation (PCOs) reside at the service access point between the physical connection and "layer1". These PCOs are named "L" (for Lower), Ld for D-channel, Lp for power status. The L PCOs are used to control and observe the behaviour of the IUT and test case verdicts are assigned depending on the behaviour observed at these PCOs.

Tester		SUT
Layer 2		**Layer 2**
Layer 1		**IUT**
L, Ld		
PCOs		
	Service provider	
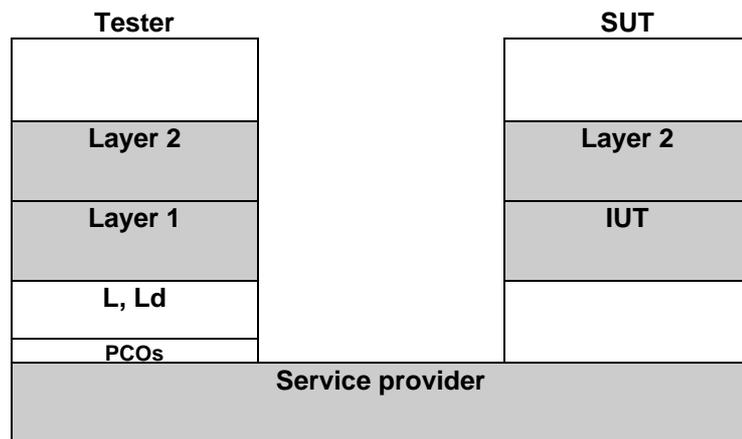
Figure 1: Remote test method

Actions by the IUT are caused by either of the following events:

- with layer 1 Protocol Data Units (PDUs) delivered to the IUT via the physical connection;

- with external actions on the IUT. These events are described with Tree and Tabular Combined Notation (TTCN) "implicit send events" whose practical execution is strictly related to the IUT features.

Only PDUs received from the IUT via the physical connection are directly accessible to the tester. By means of the PDUs received the following is tested for conformance:

- correct response of the IUT to a stimulus from the tester;

- correct timer duration of the implement timers;

- state transition.

Both "normal" and provocative testing are considered according to the tester behaviour.

4.1   Particularities of the physical layer

In upper layers, the tester and the IUT do not always send something, but in physical layer to send nothing means to send Info 0. Then we shall consider in the dynamic part that when the tester action is not specified, that means that it is still sending the last specified Info.

It is quite long to specify every Info 3 emitted by the tester to try to establish Data LinK Layer. Then an operation is used to continuously fill in D-Bit positions inside Info 3.

5   Untestable test purposes

There are no untestable test purposes associated with this ATS.

6   ATS conventions

6.1   General design issues

Clause 6 is structured similarly to the structure of a TTCN ATS. However, the names of the subclauses are arranged in a way more suitable to this ETS.

6.1.1 Declarations part

6.1.1.1 Type definitions

6.1.1.1.1 Simple type definitions

Where appropriate, simple types have a length, a value list or a range restriction attached.

Simple types defined as being of some string type (e.g. BITSTRING, OCTETSTRING, IA5Sting), have a length restriction or a value list attached.

Simple types, defined as being of INTEGER type, have a value list or a range restriction attached.

6.1.1.1.2 Structured type definitions

6.1.1.1.2.1 TTCN structured type definitions

All structured type definitions are provided with a full name.

All elements in every structured type definition, defined as being of some string type (e.g. BITSTRING, OCTETSTRING), have a length restriction attached.

If an element in a structured type definition is defined as being of a referenced type, the (possible) restriction is defined in that referenced type.

For information elements the identifier, which is unique for each element, has its type defined as a simple type where the value list is restricted to the single value which is the identifier itself. This has the advantage that it allows a test system derived from this ATS to easily identify information elements embedded in messages. An ATS where information element identifiers are represented as unrestricted types can present difficulties for a derived test system in the case where it needs to find one information element embedded in a number of others and the constraints for the other elements have the any-or-omit value. In such a case the test system cannot easily find the beginning of each information element.

6.1.1.1.2.2 ASN.1 structured type definitions

There are no ASN.1 structured type definitions in the ATS.

6.1.1.1.3 Abstract Service Primitive (ASP) type definitions

6.1.1.1.3.1 TTCN ASP type definitions

TTCN ASP type definitions contain PDU or no PDU at all. There exist two ASP type definition for PDU type definition (this ASP types contain a metatype PDU as parameter) used to send and receive PDUs.

All TTCN ASP type definitions are provided with a full identifier.

Table 1: TTCN ASP type definition PH_ACT_RQ

TTCN ASP type definition		
ASP NAME: PH_ACT_RQ **PCO type**: SAP **Comments**: In order, IUT to establish or disconnect a call.		
Parameter Name	**Parameter Type**	**Comments**
CALL	**BOOLEAN**	
Detailed Comments:		

Some ASPs are not parameterized. Such ASPs are only used for requesting or receiving service from the lower layer.

6.1.1.1.3.2 ASN.1 ASP type definitions

There are no ASN.1 ASP type definitions in the ATS.

6.1.1.1.4 PDU type definitions

6.1.1.1.4.1 TTCN PDU type definitions

The TTCN PDU type reflects the actual data being transferred or received. The metatype PDUs are embedded in ASPs.

If a specific PDU type definition contains elements defined in terms of a pre-defined type, that element has a restriction attached to it.

6.1.1.1.4.2 ASN.1 PDU type definitions

There are no ASN.1 PDU type definitions in the ATS.

6.1.1.2 Test suite constants

Each Test Suite Constants is defined in terms of a predefined type in this ATS (INTEGER) and used for timer durations which are not derived from the Protocol Implementation Conformance Statement (PICS). The referenced type can have a length or value restriction attached to it in its declaration table.

6.1.1.3 Test suite parameters

Each test suite parameter is defined in terms of a predefined type or a referenced type. A referenced type is used when it is necessary to attach restrictions to these type definitions (it is not allowed to include restrictions directly in the test suite parameter table). The referenced type can have a length or value restriction attached to it in its declaration table.

6.1.1.4 Variables

6.1.1.4.1 Test suite variables

Each test suite variables is defined in terms of a predefined type in this ATS (INTEGER). The referenced type can have a length or value restriction attached to it in its declaration table.

6.1.1.4.2 Test case variables

Each test case variable is defined in terms of a predefined type or a referenced type. A referenced type is used when it is necessary to attach restrictions to these type definitions (it is not allowed to include restrictions directly in the test case variable table). The referenced type can have a length or value restriction attached to it in its declaration table.

Where test case variables are used in constraints, they are passed as formal parameters.

6.1.1.5 Test suite operation definitions

The description part of a test suite operation definition uses natural language.

6.1.1.6 Alias definitions

No alias definitions are used or defined in this ATS.

6.1.2 Constraint part

6.1.2.1 Structured type constraint declaration

For every structured type definition there exists one or more structured type constraints.

6.1.2.2 ASN.1 type constraint declaration

No ASN.1 type constraint declaration exist in this ATS.

6.1.2.3 ASP type constraint declaration

6.1.2.3.1 ASN.1 ASP type constraint declaration

No ASN.1 ASP type constraint declaration exist in this ATS.

6.1.2.3.2 TTCN ASP type constraint declaration

For TTCN ASP constraint declarations there is a one-to-one relationship between its type and the constraint. That is, there is only one constraint for each TTCN ASP type declaration. The reason for this is that the ASPs are used only for carrying PDU value. The many ASP constraints (and types) could have been avoided by using the metatype PDU, but that was not suitable as values inside a specific PDU have to be referenced. To reference elements inside a value of metatype PDU is not allowed according to ISO 9646-3 [6], so each ASP has to be defined as having a parameter of a specific PDU type.

In all ASP constraints the embedded PDU constraint is either chained static or "semi-dynamic". That is, the PDU constraint is always fixed to a specific ASP constraint but it (the PDU) may be parameterized.

All ASP constraints have a specific value for its parameter. No matching symbols are used in ASPs.

6.1.2.4 PDU type constraint declaration

6.1.2.4.1 ASN.1 PDU type constraint declaration

No ASN.1 PDU type constraint declaration exists in this ATS.

6.1.2.4.2 TTCN PDU type constraint declaration

PDU constraints are used for assigning values or patterns to the data being sent or received.

6.1.2.5 Chaining of constraints

6.1.2.5.1 Static chaining

Static chaining, that is a fixed reference to a specific constraint, is used in this ATS. The static chaining is used for static binding of both variables and sub-structures.

6.1.2.5.2 Dynamic chaining

Dynamic chaining is achieved when having a reference to a value which is unknown. The only thing known (before run-time) is the type of that reference. The reference is passed as a parameter. Strict dynamic chaining is not used in this ATS. What is used is something that is called "semi-dynamic chaining". The definition of semi-dynamic chaining is that the fixed reference is parameterized with an unknown value. That value is received as a parameter.

6.1.2.6 Derived constraint

No derivation of any constraints is used. All constraints are considered to be base constraints.

6.1.2.7 Parameterized constraints

Parameterized constraints are used in this ATS.

6.1.2.8   Value assignment

6.1.2.8.1   Specific values

For specific value assignment both explicit values and references to explicit values are used. **It is possible that this ATS will be refined to have Test Suite Constants instead of explicit values used in several constraints. For the moment, Test Suite Constants are not used in this ATS.**

6.1.2.8.2   Matching values

As matching values the following mechanisms are used:

Instead of value:

AnyOrOmit	"*"
AnyValue	"?"
Omit	"-"

Inside value:

AnyOne	"?"
AnyOrNone	"*"

6.1.3   Dynamic part

6.1.3.1   Test cases

Each test case contains the test purpose text from the relevant TSS&TP part of this ETS. To be able to read and understand the test case dynamic behaviour it is recommended that the test steps are understood first.

6.1.3.2   Test steps

Much use has been made of test steps to avoid needless repetition of dynamic behaviour. Many test steps are based on those used for the ISDN basic call ATS.

6.1.3.3   Defaults

The RETURN statement which is defined in DAM1 of ISO 9646-3[6] is not used. This statement allows valid background behaviour to be handled in the default tree with a possibility to return to the original set of alternatives in the test case.

7   ATS to Test Purpose (TP) map

The identifiers used for the TPs are reused as test case names. Thus there is a straightforward one-to-one mapping.

8   Protocol Conformance Test Report (PCTR) conformance

A test laboratory, when requested by a client to produce a PCTR, is required, as specified in ISO/IEC 9646-5 [8], to produce a PCTR conformant with the PCTR template given in annex B of ISO/IEC 9646-5 [8].

Furthermore, a test laboratory, offering testing for the ATS specification contained in annex B, when requested by a client to produce a PCTR, is required to produce a PCTR conformant with the PCTR proforma contained in annex A of this ETS.

A PCTR which conforms to this PCTR proforma specification shall preserve the content and ordering of the clauses contained in annex A. Clause A.6 of the PCTR may contain additional columns. If included, these shall be placed to the right of the existing columns. Text in italics may be retained by the test laboratory.

9 ATS conformance

The test realizer, producing a Means Of Testing (MOT) and Executable Test Suite (ExTS) for this Abstract Test Suite (ATS) specification, shall comply with the requirements of ISO/IEC 9646-4 [7]. In particular, these concern the realization of an ExTS based on each ATS. The test realizer shall provide a statement of conformance of the MOT to this ATS specification.

An ExTS which conforms to this ATS specification shall contain test groups and test cases which are technically equivalent to those contained in the ATS in annex B. All sequences of test events comprising an abstract test case shall be capable of being realized in the executable test case. Any further checking which the test system might be capable of performing is outside the scope of this ATS specification and shall not contribute to the verdict assignment for each test case.

Test laboratories running conformance test services using this ATS shall comply with ISO/IEC 9646-5 [8].

A test laboratory which claims to conform to this ATS specification shall use an MOT which conforms to this ATS.

Annex A (normative): Protocol Conformance Test Report (PCTR) proforma

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 PCTR proforma in this annex so that it can be used for its intended purposes and may further publish the completed PCTR.

A.1 Identification summary

A.1.1 Protocol conformance test report

PCTR number:	
PCTR date:	
Corresponding System Conformance Test Report (SCTR) number:	
Corresponding SCTR date:	
Test laboratory identification:	
Test laboratory manager:	
Signature:	

A.1.2 IUT identification

Name:	
Version:	
Protocol specification:	ETS 300 012-1 [1]
PICS:	
Previous PCTRs (if any):	

A.1.3 Testing environment

PICS Reference number:	
ATS Specification:	ETS 300 012-7
Abstract Test Method:	Remote test method (see ISO/IEC 9646-2 [5])
Means of Testing (MOT) identification:	
Dates of testing:	
Conformance Log reference(s):	
Retention date for Log reference(s):	

A.1.4   Limits and reservations

Additional information relevant to the technical contents or further use of the test report, or to the rights and obligations of the test laboratory and the client, may be given here. Such information may include restriction on the publication of the report.

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A.1.5   Comments

Additional comments may be given by either the client or the test laboratory on any of the contents of the PCTR, for example, to note disagreement between the two parties.

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A.2   IUT conformance status

This IUT has or has not been shown by conformance assessment to be non-conforming to the specified protocol specification.

Strike the appropriate words in this sentence. If the PICS for this IUT is consistent with the static conformance requirements (as specified in clause A.3 of this report) and there are no "FAIL" verdicts to be recorded (in clause A.6) strike the words "has or", otherwise strike the words "or has not".

A.3   Static conformance summary

The PICS for this IUT is or is not consistent with the static conformance requirements in the specified protocol.

Strike the appropriate words in this sentence.

A.4   Dynamic conformance summary

The test campaign did or did not reveal errors in the IUT.

Strike the appropriate words in this sentence. If there are no "FAIL" verdicts to be recorded (in clause A.6 of this report) strike the words "did or", otherwise strike the words "or did not".

Summary of the results of groups of tests:

_____

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_____

_____

A.5   Static conformance review report

If clause A.3 indicates non-conformance, this subclause itemises the mismatches between the PICS and the static conformance requirements of the specified protocol specification.

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A.6 Test campaign report

Table A.1: Test campaign report

ATS reference	Selected ? (Y/N)	Run ? (Y/N)	Verdict	Observations
AD1G1_PH_AR				
AD2aG1_CHK_T1				
AD2bG1_CHK_T1				
AD3aG1_CHK_T2				
AD3bG1_CHK_T2				
AD3cG1_CHK_T2				
AD3dG1_CHK_T2				
AD4G1_RX_I0				
AD5G1_RX_I1				
AD6aG2_MPH_DR				
AD6bG2_MPH_DR				
AD7aG2_CHK_T1				
AD7bG2_CHK_T1				
AD7cG2_CHK_T1				
AD7dG2_CHK_T1				
AD8G2_CHK_T2				
AD9aG2_RX_I0				
AD9bG2_RX_I0				
AD10G2_RX_I1				
AD11aG2_RX_I3				
AD11bG2_RX_I3				
AD12G3_MPH_DR				
AD13G3_CHK_T2				
AD14G3_RX_I0				
AD15G3_RX_I3				
AD16G3_Lostfr				
TIG1aInfo1				
TIG2bInfo3				
TIG2timerT2				
TIG3DEACT				
FAG3IX_1fr				
FAG3IX_kfr				
FAG3regain				
MUltiframe				
ING3HDLCflags				
ING3BinaryOnes				
DEG3ECHO				

A.7   Observations

Additional information relevant to the technical content of the PCTR are given here.

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Annex B (normative): Abstract Test Suite (ATS)

This ATS shall be used where the IUT claims to support layer 1 basic access.

This ATS has been produced using the Tree and Tabular Combined Notation (TTCN) according to ISO/IEC 9646-3 [6].

The ATS was developed on a separate TTCN software tool and therefore the TTCN tables are not completely referenced in the contents table. The ATS itself contains a test suite overview part which provides additional information and references.

B.1 The TTCN Graphical form (TTCN.GR) for basic access

The TTCN.GR representation of this ATS is contained in an Adobe Portable Document Format™ file (L1baib.PDF contained in archive 0127_e2.ZIP) which accompanies the present document.

B.2 The TTCN Machine Processable form (TTCN.MP) for basic access

The TTCN.MP representation corresponding to this ATS is contained in an ASCII file (L1baib.mp contained in archive 0127_e2.ZIP) which accompanies the present document.

NOTE: According to ISO/IEC 9646-3 [6], in case of a conflict in interpretation of the operational semantics of TTCN.GR and TTCN.MP, the operational semantics of the TTCN.GR representation takes precedence.

Annex C (informative): General structure of ATS

This informative annex gives a simple listing of the order of types of tables which appear in this ATS. This is intended as an aid in helping readers find particular sections quickly.

Test suite overview

Test suite structure

Test case index

Test step index

Default index

Declarations part

Simple type definitions

Structured type definitions

Test suite operation definitions

Test suite parameter declarations

Test case selection expression definitions

Test suite constant declarations

Test suite variable declarations

Test case variable declarations

PCO declarations

Timer declarations

TTCN ASP type definition

TTCN PDU type definition

Constraints part

Structured type constraint declarations

TTCN ASP constraint declarations

TTCN PDU constraint declarations

Dynamic part

Test case dynamic behaviour

Test step dynamic behaviour

Default dynamic behaviour

History

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