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Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 1; Test specification

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Signalling Protocols and Switching (SPS) Technical Committee of the European Telecommunications Standards Institute (ETSI).

The text of this ETS is almost identical to that contained in CCITT Recommendations Q.784 (1991) and Q.785 (1991). It has therefore been decided to endorse the text of CCITT Recommendations Q.784 (1991) and Q.785 (1991), and to specify the exceptions to those Recommendations in this ETS.

A Tree and Tabular Combined Notation (TTCN) version of the tests contained in CCITT Recommendation Q.784 (1991) is included as an informative annex to this ETS.

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1 Scope

This European Telecommunication Standard (ETS) specifies a detailed set of validation and compatibility tests that validate the protocol specified in ETS 300 121 [4]. The tests confirm that the Signalling System No.7 Integrated Services Digital Network (ISDN) User Part (ISUP) protocol supported by any given implementation on the international interface has the ability to correctly convey the necessary signalling information to support the supplementary services specified in ETS 300 121 [4].

The requirements of this ETS are almost identical to those contained in CCITT Recommendations Q.784 [2] and Q.785 [3]. This ETS endorses the text of CCITT Recommendations Q.784 [2] and Q.785 [3]. It specifies the exceptions to those Recommendations, and some additional requirements.

A TTCN version of the tests contained in CCITT Recommendation Q.784 [2] is included as an informative annex to this ETS.

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] CCITT Recommendation Q.780 (1988): "Signalling system No.7 test specification general description".

[2] CCITT Recommendation Q.784 (1991): "ISUP basic call test specification".

[3] CCITT Recommendation Q.785 (1991): "ISUP protocol test specification for supplementary services".

[4] ETS 300 121 (1992): "Integrated Services Digital Network (ISDN); Application of the ISDN User Part (ISUP) of CCITT Signalling System No.7 for international ISDN interconnections (ISUP version 1)".

[5] ETS 300 336: "Integrated Services Digital Network (ISDN); Signalling System No.7; Message Transfer Part (MTP); Test specification".

3 Abbreviations

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

ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
MTP	Message Transfer Part
TTCN	Tree and Tabular Combined Notation

4 Requirements

4.1 General principles of validation and compatibility testing

For the general principles of validation and compatibility testing, CCITT Recommendation Q.780 [1] shall apply.

4.2 Message Transfer Part (MTP) compatibility testing

For compatibility testing, this ETS requires that the Message Transfer Part (MTP) of Signalling System No.7 shall have been tested to ETS 300 336 [5].

4.3 Text of CCITT Recommendation Q.784

The text of CCITT Recommendation Q.784 [2] shall apply, with the exceptions identified in subclause 4.4 of this ETS.

4.4 Exceptions to CCITT Recommendation Q.784

The following test numbers in § 6 of CCITT Recommendation Q.784 [2] are not applicable for the basic call procedures in ETS 300 121 [4]:

- test number 1.5.4; and

- test number 8.

With respect to the tests covering the circuit group blocking and unblocking procedures, the following applies:

The valid range value indicated in the group blocking/unblocking messages may be up to 255, but the number of status bits set to "1" (identifying the affected circuits) shall be 32 or less (as indicated in CCITT Recommendation Q.767 § C.3.27b).

4.5 Text of CCITT Recommendation Q.785

The text of CCITT Recommendation Q.785 [3] shall apply, with the exceptions identified in subclause 4.6 of this ETS.

4.6 Exceptions to CCITT Recommendation Q.785

The following test numbers in § 5 of CCITT Recommendation Q.785 [3] are not applicable for the supplementary services supported by ETS 300 121 [4]:

- test number 3.5.1;

- test number 3.5.2;

- test number 3.6.1;

- test number 3.6.2;

- test number 3.6.3; and

- test number 3.6.4.

Annex A (informative): TTCN version of CCITT Recommendation Q.784

A.1 Scope

This annex provides the test specification for the basic call procedures of Signalling System No.7 ISUP (CCITT Recommendations Q.761 to Q.764 and Q.767) based on CCITT Recommendation X.292 (ISO/IEC 9646). This test specification makes use of the Tree and Tabular Combined Notation (TTCN) and reflects the content of the test specification described in CCITT Recommendation Q.784 [2]. In all cases of conflict between the text of CCITT Recommendation Q.784 [2] and this TTCN annex, then CCITT Recommendation Q.784 [2] takes precedence.

A.2 Abbreviations

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

ASP	Abstract Service Primitive
ATS	Abstract Test Suite
CAB	Circuit PCO between service provider and signalling point B
CPT	Compatibility Test
IUT	Implementation Under Test
LAB	Lower Tester PCO between service provider and signalling point B
LT	Lower Tester
PCO	Point of Control and Observation
PDU	Protocol Data Unit
TTCN	Tree and Tabular Combined Notation
VAT	Validation Test
UT	Upper Tester
UTA	Upper Tester PCO at signalling point A

A.3 Test methodology

This test specification in TTCN makes use of the abstract test methodology as described below.

The test methodology used for ISUP testing is called the distributed test method (see figure 1). With this test method an abstract configuration for testing is established, which does not constrain the implementation of test machines. The configuration consists of the Implementation Under Test (IUT) and the tester. The main functionalities of the tester are separated into a Lower Tester (LT) and an Upper Tester (UT).

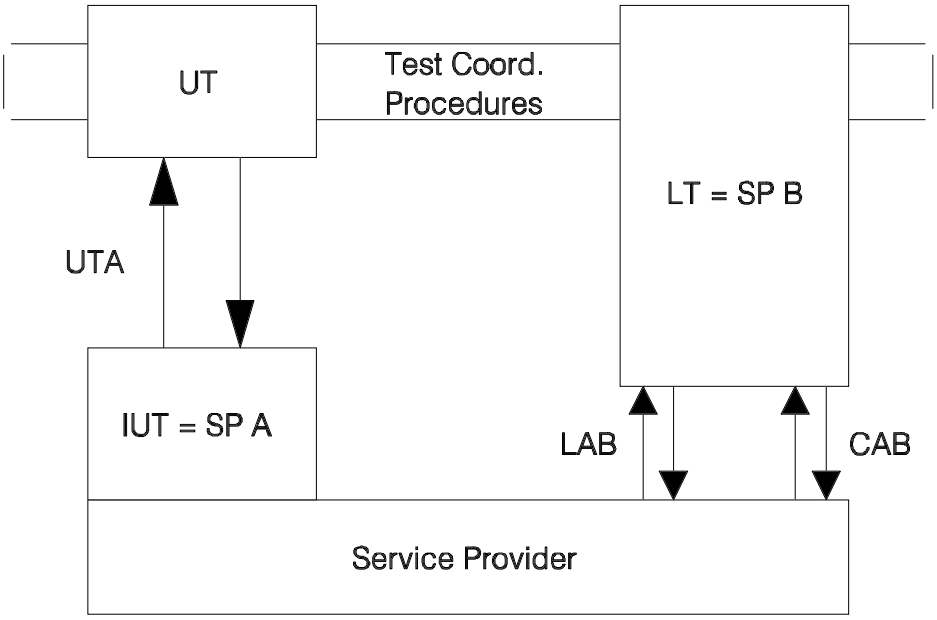

Figure 1: ISUP test method

In principle, the lower tester has the capabilities to control and observe the IUT at its lower boundary via the underlying service provider. The upper tester has the capabilities to control and observe the IUT at its upper boundary.

For ISUP testing in particular, the lower tester controls and observes the IUT from the signalling point of view via the underlying service provider MTP and from the connection point of view via a predefined number of circuits. The upper tester controls and observes the IUT by handling calls. In addition the upper tester should control the MML-interface and should observe the indications for maintenance purposes.

A.4 Explanation to the test specification

An Abstract Test Suite (ATS) specification written in TTCN needs to contain the following four parts:

a) the overview, giving the structure of the test suite, for general information and understanding;

b) the declaration part, giving all the objects, e.g. constants, variables, Points of Control and Observation (PCOs), timers, Protocol Data Unit types (PDU types) and Abstract Service Primitive types (ASP types);

c) the constraints part, giving the actual values for Protocol Data Units (PDUs) and Abstract Service Primitives (ASPs);

d) the dynamic part, describing each test case behaviour.

A.4.1 Test suite overview

The test suite overview is a sort of directory. It provides an index to the test suite and can be used for documentation and reference. The overview indicates the name of the test suite; references to the relevant protocol standards; information on the abstract test method and a test suite structure, an index to the test cases, test steps and defaults contained in the dynamic part. The relation between the test list of CCITT Recommendation Q.784 [2] and the TTCN test groups and test case names is indicated in the test suite structure and test case index tables.

The test suite overview for this ISUP test specification is given in Clause A.6.

A.4.2 TTCN declarations

The declaration part should mention all the objects used in the dynamic part. The TTCN notation provides a particular format for all sorts of objects to be declared. The declarations for ISUP are given in Clause A.7.

Clause A.7 identifies:

- test suite parameters and test suite constants. These are introduced to enable test case selection procedures;

- test suite variables. These are declared for use in test cases, e.g. RSC_Received in test case ISUPB50203;

- three PCOs. These are used in the ISUP test suite:

  LAB: lower tester PCO between service provider and signalling point B. By means of this PCO ISUP signalling information is exchanged between the lower tester and the IUT;

CAB: circuit PCO between service provider and signalling point B. By means of this PCO circuit control procedures, e.g. connectivity check and echo control check, are accomplished;

UTA: upper tester PCO at signalling point A. Some kind of stimulus operations to generate and clear calls, to activate circuit supervision procedures, etc., are assumed;

- all timer identifiers and the corresponding duration;

- the ASP types which is an incomplete TTCN declaration. A TTCN ASP declaration consists of the ASP type identifier, the PCO type identifier and the ASP structure. The last part of this declaration is omitted, in order to create the same level of abstraction as described in the CCITT Recommendation Q.784 [2] test specification using the CCITT Recommendation Q.780 [1] methodology;

- the PDU types for which the same approach described previously is applied.

A.4.3 TTCN constraints

The ASPs given in combination with the send and receive events in the dynamic part are references to instances of ASP types. Every instance of an ASP type, called ASP constraint, specifies an actual ASP value. An ASP constraint may carry a PDU constraint. All ASP and PDU constraints are grouped in the TTCN constraints part. The constraints part for ISUP are given in Clause A.8.

Due to the high level of abstraction which is required, only the ASP constraint identifier and its ASP type identifier are described in this test suite. The actual values of the constraints are not envisaged.

The ASPs used in this test suite are grouped into:

user ASPs: these ASPs are stimuli to establish a call, to release a call, to suspend a call, to resume a call and to check the provision of tones and announcements;

maintenance ASPs: one maintenance ASP is declared to represent a maintenance indication from the IUT;

mml ASPs: several mml ASPs are described to enable the activation of circuit supervision procedures within ISUP;

circuit ASPs: this category ASPs are exchanged by some functionality which enables circuit control procedures, e.g. connectivity check;

call setup ASPs: the call setup ASPs represent the corresponding call setup PDUs in ISUP;

call release ASPs: the call release ASPs represent the corresponding call release PDUs in ISUP;

circuit supervision ASPs: the circuit supervision ASPs represent the corresponding circuit supervision PDUs in ISUP.

A.4.4 TTCN dynamic part

The TTCN dynamic part contains the main body of the test suite, i.e.:

- the test cases grouped into test groups: each test case represents one test purpose. Subclause A.9.1 contains the test cases representing the purposes as mentioned in the ISUP test list (see Clause A.5);

- the test steps grouped into the test step library: a test step can be called by all test cases defined in the test suite. A test step can be represented as a procedure call or subroutine as defined in a programming language. The ISUP test suite does use this TTCN construct e.g. to achieve pre-test conditions and to check specific circuit operations. The required test steps for the ISUP test suite are specified in subclause A.9.2.

- the default groups: if a test case or a test step refers to a default tree, then the content of the default tree covers additional alternatives to receive events specified in that test case or test step. In that case any received behaviour other than the expected behaviour as specified in the test case or test step will be handled by the default tree. A very generic default tree for this ISUP test specification is specified in subclause A.9.3.

The test specification is based on the test methodology described above. By means of well chosen identifiers for PCOs and ASPs the used test methodology is expressed.

The identifications of the ASPs are self explaining. Although, the TTCN constraints part should clarify the contents of the ASPs, this is not done in order to create the same level of abstraction as described in the CCITT Recommendation Q.784 [2] test specification using the CCITT Recommendation Q.780 [1] methodology (the actual message content is not specified).

In this test specification only the method of "explicit final verdict" is used (i.e. in each leaf of the behaviour tree an entry occurs in the verdict column of the dynamic behaviour tables). If the leaf is an ATTACH construct (i.e. test step reference), this verdict has the following meaning: the verdict applies to each leaf of the behaviour tree of the test step.

A.4.5 Application of TTCN version for validation test and compatibility test

This TTCN version of CCITT Recommendation Q.784 [2] is applicable for both Validation Test (VAT) and Compatibility Test (CPT). It is a conceptual description of the test process which in no way implies any implementation of the test system. This means that in case of VAT the LT could be a test box or a real exchange with other supporting equipment. In case of CPT the LT is a real exchange (SP B) with supporting equipment.

A.5 ISUP test list

1 Circuit supervision

1.1 Non allocated circuits
1.2 Reset of circuits
- 1.2.1 RSC received on an idle circuit
- 1.2.2 RSC sent on an idle circuit
- 1.2.3 RSC received on a locally blocked circuit
- 1.2.4 RSC received on a remotely blocked circuit
- 1.2.5 Circuit group reset received
- 1.2.6 Circuit group reset sent
- 1.2.7 Circuit group reset received on remotely blocked circuits

1.3 Blocking of circuits
- 1.3.1 Circuit group blocking unblocking
  - 1.3.1.1 CGB and CGU received
  - 1.3.1.2 CGB and CGU sent
- 1.3.2 Circuit blocking unblocking
  - 1.3.2.1 BLO received
  - 1.3.2.2 BLO sent
  - 1.3.2.3 Blocking from both ends removal of blocking from one end
  - 1.3.2.4 IAM received on a remotely blocked circuit

1.4 Continuity check test call
- 1.4.1 CCR received successful
- 1.4.2 CCR sent successful
- 1.4.3 CCR received unsuccessful
- 1.4.4 CCR sent unsuccessful
- 1.4.5 CCR received unsuccessful verify T27 timer

1.5 Receipt of unreasonable signalling information messages
- 1.5.1 Receipt of unexpected messages
- 1.5.2 Receipt of unexpected messages during call setup
- 1.5.3 Receipt of unexpected messages during a call
- 1.5.4 Confusion procedures For further study

2 Normal call setup - ordinary speech calls

2.1 Both way circuit selection
- 2.1.1 IAM sent by controlling SP
- 2.1.2 IAM sent by non controlling SP

2.2 Called address sending
- 2.2.1 En bloc operation
- 2.2.2 Overlap operation with SAM

2.3 Successful call setup
- 2.3.1 Ordinary call with various indications in ACM
- 2.3.2 Ordinary call with ACM CPG and ANM
- 2.3.3 Ordinary call with various indications in CON
- 2.3.4 Call switched via a satellite
- 2.3.5 Echo control procedure for call setup
- 2.3.6 Blocking and unblocking during a call initiated
- 2.3.7 Blocking and unblocking during a call received

3 Normal call release

3.1 Calling party clears before address complete
3.2 Calling party clears before answer
3.3 Calling party clears after answer
3.4 Called party clears after answer
3.5 Suspend initiated by the network
3.6 Suspend and resume initiated by a calling party
3.7 Suspend and resume initiated by a called party
3.8 Collision of REL messages