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PICS AND ABSTRACT TEST SUITE FOR ISDN DSS 1 LAYER 3 – CIRCUIT MODE, BASIC CALL CONTROL CONFORMANCE TESTING

ITU-T Recommendation Q.931 *bis*

(Previously “CCITT Recommendation”)

FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (ITU). The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

ITU-T Recommendation Q.931 *bis* was prepared by ITU-T Study Group 11 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 7th of February 1995.

NOTE

this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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* Available only in electronic format.

Recommendation Q.931 *bis*[1)]

PICS AND ABSTRACT TEST SUITE FOR ISDN DSS 1 LAYER 3 – CIRCUIT MODE, BASIC CALL CONTROL CONFORMANCE TESTING

(Geneva, 1995)

1 Introduction

This Recommendation presents the Protocol Implementation Conformance Statement (PICS) and the Abstract Test Suite (ATS) for DSS 1 Layer 3, Circuit Mode, Basic Call Control described in Tree and Tabular Combined Notation (TTCN). This Recommendation aligns with the principles defined in OSI Conformance Testing Methodology and Framework Recommendations X.290 to X.294, inclusive [1].

The PICS documents annexed to this Recommendation are annexes of Recommendation Q.931 (1988) and are used in the abstract test suite for test selection (see 2.6).

For basic rate, user-side testing, two equally valid but different Abstract Test Suites (ATS) have been submitted for ITU-T consideration. Although these two ATS share a common subset of test purposes, they employ different test methods. This would make the comparability of the test results between the two ATS extremely difficult. In order to facilitate the comparability of the test results, which is fundamental to the achievement of the desirable goal of one-stop testing on a worldwide basis, it has been agreed that only one internationally standardized ATS is required for each protocol. Given the advanced stage of introduction of conformance testing within some countries, it has further been agreed that a reasonable transition period is required before it is possible to move to a single standardized ATS. This Recommendation therefore contains two recommended ATS, one in the body of the text and the other in Annex A. During the transition period, organizations wishing to follow this Recommendation have the option of using either or both ATS, or a subset applicable to their environment. However, from 1 January 1995, the ATS for basic rate and primary, user-side testing, contained in the body of this Recommendation will be the only recommended ATS. The ATS contained in Annex A is recommended for use during the transition period ending 31 December 1994 only.

Subclause 1.1 describes the scope and field of application which provides an objective basis for the applicability of the tests. Clause 2 contains general aspects of testing and the Protocol Implementation Extra Information for Testing (PIXIT) proforma. Clause 3 contains abbreviations used in this Recommendation.

The type of TTCN used in the development of the test suite for basic rate, user-side testing, pre-dates that to be found in Recommendation X.292 [1]. However, as reflected in Recommendation X.292 [1], Recommendations produced during the 1989-1992 study period that use a version of TTCN that pre-dates Recommendation X.292 [1] and which append to the Recommendation a copy of the specification of that version of TTCN used, will be regarded as compliant to Recommendation X.292. For that reason, Appendix I, OSI Conformance Testing Methodology and Framework for Protocol Recommendations for ITU-T Applications – Tree and Tabular Combined Notation (TTCN), contains full information on the version of TTCN used for the preparation of the test suite for basic rate, user-side testing.

1.1 Scope and field of application

The abstract test suite for conformance testing is based on Recommendation Q.931 [2] for Circuit Mode, Basic Call Control. The Implementation Under Test (IUT) is the user's side implementation of Q.931 Basic Call Control. The System Under Test (SUT) is functionally a Terminal Equipment of Type 1 (TE1) or a Terminal Adapter (TA).

The test methodology is the "layer embedded testing" as described in Recommendation X.291 [1]. It is possible that the entire test suite is not applicable for all IUTs. A test selection procedure has to be performed to determine the applicability of a test to a particular IUT. Such selection shall be based on the Protocol Implementation Conformance

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1) Only the introduction, General Aspects and Abbreviations, clauses of this Recommendation are available in printed form. All other clauses, including the ATS, are available in electronic format (i.e. diskette) only.

Statement (PICS) and Protocol Implementation Extra Information for Testing (PIXIT). In doing such a selection, inter-operability among ISDN equipment shall be of prime importance. The abstract test cases contained in this Recommendation are a comprehensive reflection of the base standards.

This abstract test suite only uses a single TEI link and assumes that the IUT only supports a single TEI link. This test suite tests that the IUT does not violate any of the Circuit Switched procedures of Recommendation Q.931 [2]. The preferred use of this suite is under conditions where the only messages that are sent across the interface are those in response to events in the test cases themselves. In order to allow for conditions where the SUT might send extraneous messages (e.g. HOLD Q.932 [3]), the design of the suite is such that the verdict will not be affected by the receipt of these messages.

The conformance testing for the Q.931 Circuit Mode, Basic Call Control protocol is covered in four abstract test suites, presented below.

1.1.1 Basic rate user-side

The abstract test suite for conformance testing equipment for basic access on the user-side of the interface is specified in clause 4 (or alternatively Annex A, Part 1).

1.1.2 Basic rate network-side

For further study.

1.1.3 Primary rate user-side

The abstract test suite for conformance testing equipment for primary rate access on the user-side of the interface is specified in clause 5 (or alternatively Annex A, Part 3).

1.1.4 Primary rate network-side

For further study.

1.2 References

The following Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision: all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

[1] ITU-T Recommendations X.290 to X.294, inclusive (1995), *OSI Conformance Testing Methodology and Framework for Protocol Recommendations for ITU-T Applications*.

[2] CCITT Recommendation Q.931 (1988), *ISDN user-network interface layer 3 specification for basic call control*.

[3] CCITT Recommendation Q.932 (1988), *Generic procedures for the control of ISDN supplementary services*.

1.3 Definitions

This test suite uses valid, syntactically invalid and inopportune messages to test the IUT behaviour. These terms are defined as follows:

- A **valid message** is one that is allowed by Recommendation Q.931 and is both syntactically correct and occurs or arrives in an allowed context.
- An **inopportune message** is one that, although syntactically correct, occurs or arrives at a point when not allowed to do so by Recommendation Q.931.
- A **syntactically invalid message** is one that, syntactically, is not allowed by Recommendation Q.931.

The naming conventions used throughout these suites for messages, information elements and test case identifiers are given in 2.1.

2 General aspects

As per Recommendations X.290 and X.291 of testing [1], "a complete and independent specification of the actions required to achieve a specific test purpose" is called an abstract test case. The abstract test cases for Q.931 basic call control are defined at the level of abstraction of layer embedded testing methodology. The test cases, along with the test body, include a preamble and a postamble, which are defined below, to ensure starting and ending in a stable state.

2.1 Test group and subgroups

2.1.1 Test group and subgroups of Part 1 and Part 3

These test suites have been split into major groups. The group name is composed of six elements:

- Element 1: ISDN3/ Name of the test suite.
- Element 2: PS/ Test case with passive IUT behaviour.
  AC/ Test case with active IUT behaviour.
  PR/ Preamble.
  PO/ Postamble.
  MS/ Miscellaneous.
  DF/ Default.
- Element 3: Uxx same meaning as the second and third digits in the test name (see below).
  UAL is identical to 99 (see below).
  R0x restart state.
- Element 4: V/ valid.
  I/ inopportune.
  S/ syntactically invalid.
- Element 5: Two letters represent the PDU (example: IN/ = Information).
  Two digits represent a timer (example: 02/ = T302).
- Element 6: N/ the test purpose of the test case is described in NET3.
  O/ the test has been created by the European CTS group.
  I/ the test has been created by the American ICOT group.

The name of the test cases, steps or defaults starts with the two letters TC followed by 5 digits.

Meaning of the first digit:

1: Test case with passive IUT behaviour.
2: Test case with active IUT behaviour.
3: Test step, preamble.
4: Test step, postamble.
5: Test step, miscellaneous.
6: Default.

The two following digits mean the:

- State in which the body of test case starts.
- State in which the preamble finishes.
- State in which postamble, miscellaneous and default start.
- The value 99 represents the possibility of starting from different states (only for test steps and defaults).

Meaning of the two last digits: continuous number.

2.1.2 Test group and subgroups of Annex A, Part 1 and Part 3

These suites been grouped into major groups:

- General: (GENERAL).
- Error: (ERROR).
- Timers: (TIMER).

– Set-up: (SETUP).
– Restart: (RESTART) – (Part 3 only).

The first group, which is the largest, contains valid and inopportune tests for all tested states. It has been further subdivided into groups representing the different call phases: IDLE, OUTGOING, INCOMING, ACTIVE and CLEARING. The second group has been divided into three groups: GENERAL, MANDATORY, NON MANDATORY. No subdivision occurs either in the third or fifth group. The fourth group is divided into GENERAL and ERROR groups. Transitional states are not tested (e.g. states U6, U9).

2.2 Preamble

The preamble of a test case consists of the step required to bring the IUT to the appropriate initial state.

2.3 Test body

The test body is the sequence of steps within a test case that is essential to achieve the test purpose, followed by the verification of the IUT's ending state. Verdicts are assigned to the possible outcomes of the test cases.

It is important to test the observable behaviour of the IUT, which includes state transitions and Protocol Data Unit (PDU) responses. If one assumes that all states are implemented, it is not possible to obtain unique traces or signature which would guarantee that the IUT is in the expected state. Also, many of the IUT states are transitional and may not be implemented. Verification routines are written with no reliance on the IUT's state. They use a unique signature observable externally to the IUT.

2.4 Postamble

For this suite, the idle state is the Null State. At the end of the execution of a test body, the IUT may not be in an "idle state". A postamble is required to bring the IUT from the ending state to an "idle state". For all states, a RELEASE COMPLETE message is sent which will release the call in progress, if any, and return the IUT to the Null State.

2.5 Timer definitions

The timer types and values used by the tester are those types and default values defined in Recommendation Q.931.

2.5.1 Timer of Part 1 and Part 3

In addition, the following timers below are also used:

– TNOAC: This timer is used if the test purpose is "no response".

– TAC: This timer is used when a response is required to achieve the test purpose.

TWAIT: This timer is used when operator action is required on the IUT. It is used for implicit sends where test coordination is required.

2.5.2 Timer of Annex A, Part 1 and Part 3

In addition, the following timers below are also used:

– Tw: This timer is used if the test purpose is "no response".

– Ts: This timer is used when a response is required to achieve the test purpose.

– Tvl: This is defined as "longer than the longest IUT timer".

– Topr: This timer is used when operator action is required on the IUT. It is used for implicit sends where test coordination is required.

2.6 PICS/PIXIT relationship to abstract test suite

There are instances when the execution of a test case depends on the answer to a PICS or PIXIT question (see 2.8: Test case selection).

2.7 PIXIT proforma

Information supplied by the IUT provider in clause 4 (electronic format) will be used to configure the tester to execute the conformance test suite. The PIXIT covers all the parameters needed for Part 1 and 3 and for Annex A, Part 1 and 3 as well.

2.8 Test case selection

The Test Case Selection is done by means of PIXIT only. ISO 9646 does not support any mechanism to represent the selection of test cases. A list has been created to express the criteria of selection (electronic format).

3 Abbreviations

For the purposes of this Recommendation, the following abbreviations are used:

ATS	Abstract Test Suite
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
IUT	Implementation Under Test
OSI	Open Systems Interconnection
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation Extra Information for Testing
SUT	System Under Test
TA	Terminal Adapter
TE1	Terminal Equipment of type 1
TTCN	Tree and Tabular Combined Notation

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