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V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); Part 7: Test Suite Structure and Test Purposes (TSS&TP) specification for the data link layer

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Foreword

This draft second edition European Telecommunication Standard (ETS) has been produced by the Signalling Protocols and Switching (SPS) Technical Committee of the European Telecommunications Standards Institute (ETSI), and is now submitted for the Public Enquiry phase of the ETSI standards approval procedure.

This ETS is part 7 of a multi-part standard covering the V5.1 interface as described below:

Part 1: "V5.1 interface specification";

Part 2: "Protocol Implementation Conformance Statement (PICS) proforma";

Part 3: "Test Suite Structure and Test Purposes (TSS&TP) specification for the network layer (AN side)";

Part 4: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network layer (AN side)";

Part 5: "Test Suite Structure and Test Purposes (TSS&TP) specification for the network layer (LE side)";

Part 6: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network layer (LE side)";

Part 7: "Test Suite Structure and Test Purposes (TSS&TP) specification for the data link layer";

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Part 8: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the data link layer";

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Part 9: "Test specification for the physical layer".

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1 Scope

This seventh part of ETS 300 324 contains the Test Suite Structure (TSS) and Test Purposes (TPs) for the Data Link Layer (DLL) of the V5.1 interface.

The conformance tests in this ETS provide a high probability of inter-operability of the DLL between an Access Network (AN) and a Local Exchange (LE) infrastructure. This ETS covers only the procedures described in ETS 300 324-1 [1] which are based upon ETS 300 125 [3].

ISO/IEC 9646-1 [5] is used as the basis for the methodology of conformance testing.

ETS 300 324-1 [1] defines the sublayers of the DLL, i.e. Link Access Protocol for V5 interface (LAPV5) Data Link sublayer (LAPV5-DL), LAPV5 Envelope Function sublayer (LAPV5-EF) and the mapping function (refer to ETS 300 324-1 [1], figure 6 which illustrates this approach). Regarding the conformance testing these sublayer functions are not tested separately. The test purposes defined in clause 5 cover testing of the LAPV5-DL (control protocol only), LAPV5-EF and the mapping function. The AN frame relay function is tested in co-operation with a generic test of an Integrated Services Digital Network (ISDN) D-channel.

The limitation of the DLL test to the Control DL is based on the assumption that the Public Switched Telephone Network (PSTN) DL implementation is identical with the Control DL implementation. This needs to be declared by the Implementation Under Test (IUT) supplier. Otherwise, the TPs defined for the Control DL may be used for the PSTN DL as well.

2 Normative references

This ETS incorporates by dated or 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.

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[1] ETS 300 324-1 (1994) including amendment A1 (1996): "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); Part 1: V5.1 interface specification".

[2] ETS 300 324-2 (1994): "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); Part 2: Protocol Implementation Conformance Statement (PICS) proforma".

[3] ETS 300 125 (1991): "Integrated Services Digital Network (ISDN); User-network interface data link layer specification; Application of CCITT Recommendations Q.920/I.440 and Q.921/I.441".

[4] ISO 7498: "Information Processing Systems - Open Systems Interconnection - Basic Reference Model".

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

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3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply, together with those given in ETS 300 324-1 [1]:

Abstract Test Suite (ATS): See ISO/IEC 9646-1 [5].

Data Link Layer (DLL): See ISO 7498 [4].

Implementation Under Test (IUT): See ISO/IEC 9646-1 [5].

Lower Tester (LT): See ISO/IEC 9646-1 [5].

Network Layer (NWK): See ISO 7498 [4].

Notional Upper Tester (UT): The upper layers of the System Under Test (SUT) are used to realize the functions of the UT, without any additional mechanism being installed.

Physical Layer (PHL): See ISO 7498 [4].

Point of Control and Observation (PCO): See ISO/IEC 9646-1 [5].

Protocol Implementation Conformance Statement (PICS): See ISO/IEC 9646-1 [5].

PICS proforma: See ISO/IEC 9646-1 [5].

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Protocol Implementation eXtra Information for Testing (PIXIT): See ISO/IEC 9646-1 [5].

PIXIT proforma: See ISO/IEC 9646-1 [5].

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System Under Test (SUT): See ISO/IEC 9646-1 [5].

3.2 Abbreviations

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

AN	Access Network
ASP	Abstract Service Primitive
ATS	Abstract Test Suite
BI	Invalid Behaviour
BO	Inopportune Behaviour
BV	Valid Behaviour
CA	Capability
DLL	Data Link Layer
EFaddr	Envelope Function address
FCS	Frame Check Sequence
FSM	Finite State Machine
ID	Identifier
ISDN	Integrated Services Digital Network
IT	Basic Interconnection
IUT	Implementation Under Test
LAPD	Link Access Protocol for the ISDN D-channel
LAPV5	Link Access Protocol for V5 interface
LAPV5-DL	LAPV5 Data Link sublayer
LAPV5-EF	LAPV5 Envelope Function sublayer
LE	Local Exchange
LT	Lower Tester
NWK	Network Layer
PCO	Point of Control and Observation

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PDU	Protocol Data Unit
PHL	Physical Layer
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PSTN	Public Switched Telephone Network
RX	Receiver condition
SAPI	Service Access Point Identifier
SUT	System Under Test
TEI	Terminal Endpoint Identifier
TI	Timer
TP	Test Purpose
TSS	Test Suite Structure
TX	Transmitter condition
UT	Upper Tester

4 Test Suite Structure (TSS)

4.1 TSS overview

Figure 1 shows the structure of the V5.1 DLL test suite.

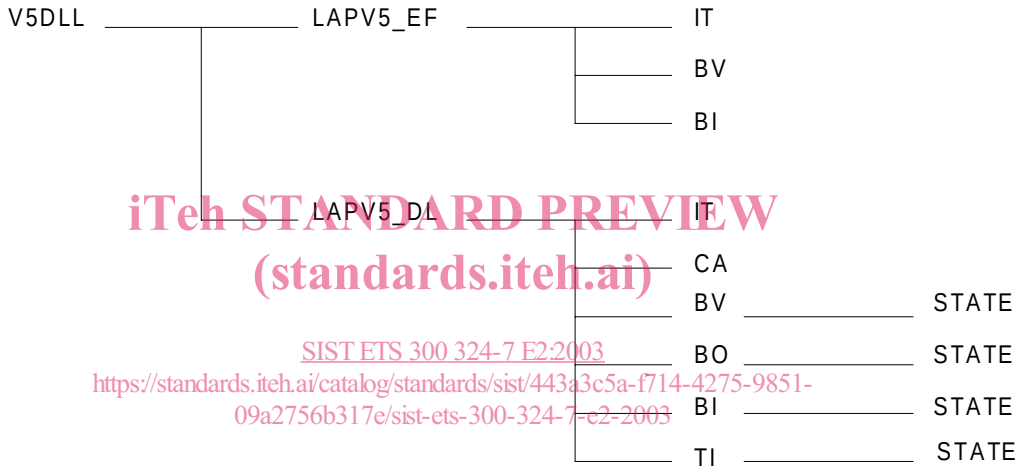

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Figure 1: DLL TSS

4.2 Test groups

4.2.1 Protocol groups

4.2.1.1 Link Access Protocol for V5 interface - Envelope Function sublayer (LAPV5-EF)

The defined test purposes cover the LAPV5-EF procedures including the mapping function and the AN relay function (see ETS 300 324-1 [1], figure 6).

4.2.1.2 Link Access Protocol for V5 interface - Data Link sublayer (LAPV5-DL)

The defined test purposes cover the LAPV5-DL (control protocol only) procedures (see ETS 300 324-1 [1], figure 6).

4.2.2 Main test groups

4.2.2.1 Basic Interconnection (IT) tests

The IT test subgroup contains a basic set of test purposes which assures that there is a sufficient conformance for inter connection and that the chosen parameters are valid for the configuration.

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4.2.2.2 Capability (CA) tests

Capability testing provides a limited testing to ascertain the main capabilities stated in the Protocol Implementation Conformance Statements (PICSs) can be observed.

4.2.2.3 Valid Behaviour (BV) tests

A valid test is a test where the message sequence and the message content is considered as valid (no MDL_ERR_IND is caused in the Finite State Machine (FSM) of the DLL entity).

4.2.2.4 Inopportune Behaviour (BO) tests

This test subgroup is intended to verify that the IUT is able to react properly, in case an inopportune protocol event occurs. Such an event is syntactically correct but it occurs when it is not expected (a MDL_ERR_IND is caused in the FSM of the DLL entity).

4.2.2.5 Invalid Behaviour (BI) tests

This test subgroup is intended to verify that the IUT is able to react properly having received an invalid Protocol Data Unit (PDU). Invalid PDU here means a syntactically invalid PDU and, therefore, a MDL_ERR_IND might be caused in the FSM of the DLL entity.

4.2.2.6 Timer (TI)

The TI test group contains tests related to the system timers T200 and T203.

4.3 Test step structure

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General dynamic behaviours should be described in test steps. The main test steps to apply the TPs described in this ETS are described in this subclause.

4.3.1 State transitions

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Two groups of state transitions are defined:

V5 interface start-up: this group contains the test steps to initialize the V5 interface.

LAPV5-DL state transitions: this group contains test steps which describe state transitions of the LAPV5-DL implementation used in different preambles.

4.3.1.1 V5 interface start-up

The start-up procedure of a V5.1 IUT (AN or LE) depends on the configuration which is provisioned (refer to subclause 5.1.6). The PICS items M1 and M2 (refer to ETS 300 324-2 [2], subclauses 6.5.1 and 6.6.1), further called TSPC_PSTN and TSPC_ISDNBA, are used to define the implemented configuration of the IUT.

NOTE: ETS 300 324-2 [2] requires at least one of two the PICS items to be set to "Yes".

PICS description:

TSPC_PSTN: PSTN ports supported;
TSPC_ISDNBA: ISDN-BA user ports supported.