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V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); 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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**V interfaces at the digital Local Exchange (LE);
V5.1 interface for the support of Access Network (AN);
Part 8: Abstract Test Suite (ATS) and partial Protocol
Implementation eXtra Information
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Contents

Intellectual Property Rights	4
Foreword	4
1 Scope	5
2 References	5
3 Definitions and abbreviations	6
3.1 Definitions	6
3.2 Abbreviations	7
4 Abstract test method.....	8
4.1 ATM.....	8
4.2 DLL protocol testing	8
4.3 Execution of test cases.....	9
4.3.1 AN-LE testing.....	9
4.3.2 Handling of error indications	9
4.3.3 Test case execution sequence.....	9
5 Untestable test purposes.....	9
6 Abstract test suite conventions.....	10
6.1 Naming conventions.....	10
6.1.1 Declaration part	10
6.1.2 Constraint part	11
6.1.3 Dynamic part.....	11
6.1.3.1 Test cases	11
6.1.3.2 Test steps.....	11
6.1.3.3 General aspects	11
6.1.4 ATS abbreviations	12
6.2 Implementation conventions.....	12
6.2.1 Declaration part	12
6.2.2 Constraint part	12
6.2.3 Dynamic part.....	13
6.2.4 Documentation.....	14
Annex A (normative): Abstract Test Suite (ATS) for DLL testing	15
A.1 The TTCN Graphical form (TTCN.GR).....	15
A.2 The TTCN Machine Processable form (TTCN.MP)	15
Annex B (normative): Partial PIXIT proforma.....	16
B.1 Introduction	16
B.2 PIXIT proforma.....	16
B.2.1 Identification summary	16
B.2.2 Abstract test suite summary	16
B.2.3 Test laboratory.....	16
B.2.4 Client	17
B.2.5 SUT	17
B.2.6 Protocol layer information.....	18
B.2.6.1 Protocol identification	18
B.2.6.2 IUT information.....	18
History	20

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN).

The present document is part 8 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";
- Part 8: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the data link layer";**
- Part 9: "Test specifications for the physical layer".

National transposition dates

Date of adoption of this EN:	28 April 2000
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Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 January 2001
Date of withdrawal of any conflicting National Standard (dow):	31 January 2001

1 Scope

This eighth part of EN 300 324 contains the Abstract Test Suite (ATS) as well as the Abstract Test Method (ATM) and the partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma for the Data Link Layer (DLL) of the V5.1 interface.

The objective of the present document is to provide an ATS containing conformance tests which give a high probability of inter-operability of an Access Network (AN) and a Local Exchange (LE) from different manufacturers over the V5.1 interface.

ISO/IEC 9646-1 [5] and ISO/IEC 9646-2 [6] are used as the basis for the test methodology. The ATS is defined using the Tree and Tabular Combined Notation (TTCN) according to ISO/IEC 9646-3 [7].

The ATS in annex A describes a set of Test Cases (TCs) which are based on the Test Purposes (TPs) specified in ETS 300 324-7 [3]. The TCs provide the implementation of the TPs and can be converted into an executable test suite by using available TTCN translators and the corresponding tools.

Annex B provides the partial PIXIT proforma.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] ETSI ETS 300 324-1 (1994) including amendment A1: "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] ETSI ETS 300 324-2 (1994): "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] ETSI ETS 300 324-7 (1999): "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".
- [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".
- [6] ISO/IEC 9646-2: "Information technology; Open Systems Interconnection; Conformance testing methodology and framework; Part 2: Abstract test suite specification".
- [7] ISO/IEC 9646-3: "Information technology; Open Systems Interconnection; Conformance testing methodology and framework; Part 3: The Tree and Tabular Combined Notation (TTCN)".
- [8] ISO/IEC 9646-5: "Information technology; Open Systems Interconnection; Conformance testing methodology and framework; Part 5: Requirements on test laboratories and clients for the conformance assessment process".

- [9] ETSI ETS 300 406: "Methods for Testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".
- [10] ETSI ETR 141: "Methods for Testing and Specification (MTS); Protocol and profile conformance testing specifications; The Tree and Tabular Combined Notation (TTCN) style guide".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

abstract test case: refer to ISO/IEC 9646-1 [5]

NOTE: In the present document, the commonly used term TC is applied in the same way as ATC.

abstract test suite: refer to ISO/IEC 9646-1 [5]

data link layer: refer to ISO 7498 [4]

embedded variant: refer to ISO/IEC 9646-2 [6]

implementation under test: refer to ISO/IEC 9646-1 [5]

lower tester: refer to ISO/IEC 9646-1 [5]

network layer: refer to ISO 7498 [4]

notional UT: upper layers of the SUT are used to realize the functions of the upper tester, without any additional mechanism being installed

physical layer: refer to ISO 7498 [4]

PICS proforma: refer to ISO/IEC 9646-1 [5]

PIXIT proforma: refer to ISO/IEC 9646-1 [5]

point of control and observation: refer to ISO/IEC 9646-1 [5]

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

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

remote test method: refer to ISO/IEC 9646-2 [6]

system under test: refer to ISO/IEC 9646-1 [5]

test purpose: refer to ISO/IEC 9646-1 [5]

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3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AN	Access Network
ASP	Abstract Service Primitive
ATM	Abstract Test Method
ATS	Abstract Test Suite
BI	Invalid Behaviour
BO	Inopportune Behaviour
BV	Valid Behaviour
CA	Capability test
DLL	Data Link Layer
ID	Identifier
IE	Information Element
IEI	Information Element Identifier
ISDN	Integrated Services Digital Network
IT	basic Interconnection Test
IUT	Implementation Under Test
LAPV5	Link Access Protocol for V5 interface
LAPV5-DL	LAPV5 Data Link sub layer
LAPV5-EF	LAPV5 Envelope Function sub layer
LE	Local Exchange
LT1	Lower Tester 1
NWK	Network (Layer)
PCO	Point of Control and Observation
PDU	Protocol Data Unit
PHL	Physical Layer
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PSAP	PHL Service Access Point
PSTN	Public Switched Telephone Network
RX	Receiver condition
SAP	Service Access Point
SAPI	Service Access Point Identifier
SUT	System Under Test
TC	Test Case
TEI	Terminal Endpoint Identifier
TI	Timer
TP	Test Purpose
TSS	Test Suite Structure
TTCN	Tree and Tabular Combined Notation
TX	Transmitter condition
UT	Upper Tester
V5DLaddr	V5 Data Link address
V5DLL	V5 Data Link Layer

4 Abstract test method

This clause describes the Abstract Test Method (ATM) and the Point of Control and Observation (PCO) used to test the DLL of the V5.1 protocol.

4.1 ATM

Principally, the remote test method is used for V5 DLL conformance testing. Certain DLL TPs need also part of the NWK functions (e.g. I frame transmission). Therefore, the embedded variant of the remote test method is applied.

4.2 DLL protocol testing

The V5.1 implementations do not offer a direct access to the upper service boundary. The remote test method was chosen because any co-ordination procedures can only be expressed in an informal way.

- LT1:** A Lower Tester (LT1) is located in a remote V5.1 test system. It controls and observes the behaviours of the IUT.
- PCO:** The PCO for DLL testing is located on the PSAP. All test events at the PCO are specified in terms of PH-Data ASPs and DLL PDUs. A single PCO is defined for DLL testing in order to exchange messages of the LAPV5-EF sub layer as well as of the LAPV5-DL sub layer.
- Notional UT:** The notional UT includes the NWK and system management functions.
- V5-DLL:** V5-DLL includes LAPV5-EF, mapping function and LAPV5-DL.
- AN test:** To test the LAPV5-EF protocol, an ISDN terminal shall be connected to the relevant user port.

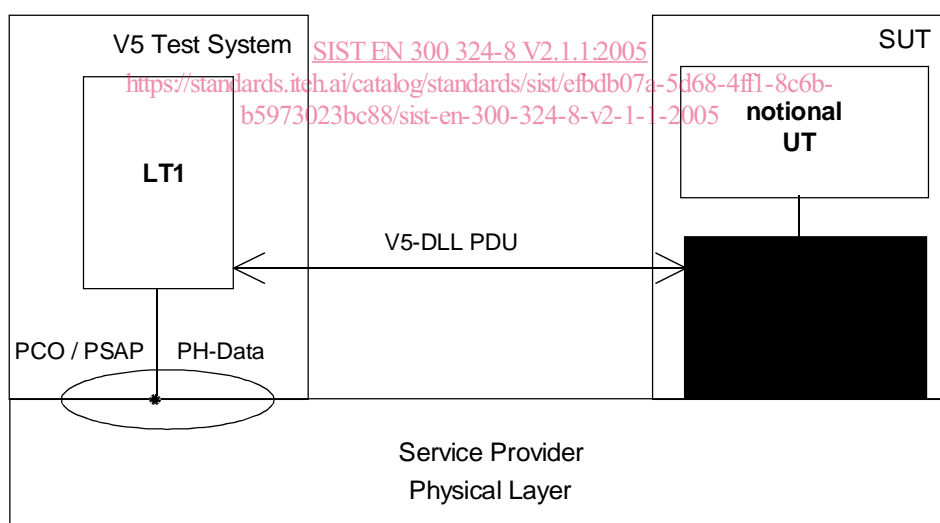


Figure 1: Remote test method applied to the V5.1 DLL testing

4.3 Execution of test cases

4.3.1 AN-LE testing

Regarding the DLL protocol of V5.1, the V5.1 interface is almost symmetrical, except that the Frame Relay function is only implemented in the AN. There are two protocol subjects which have to be adapted for LE testing, the message sequence of a generic call to the ISDN entity and the handling of the CR bit.

The generic call to the ISDN entity is stopped after having received from the IUT an UA response frame as a response to a previously sent SABME command frame. Until the ISDN link initialization, the V5.1 protocol is symmetrical as only a point-to-point connection over a single data link is established (fixed TEI).

The problem of the CR bit handling is solved in the ATS. The CR bit is defined as a test suite parameter which allows to invert the CR bit for LE testing. Table 1 documents this approach.

Table 1: AN-LE parameters

	AN	LE
TSPX_AN	TRUE	FALSE
CR_0	'0'B	'1'B
CR_1	'1'B	'0'B

4.3.2 Handling of error indications

During the execution of the DLL ATS, many MDL-ERROR-IND will be sent to the system management due to the invalid and inopportune test cases. It is up to the IUT supplier to take the necessary precautions to avoid any impact on the test result.

Some tests use NWK procedures to test DLL functions, it is not always possible to handle the NWK properly. The effects of such faulty NWK messages and procedures are out of the scope of the present document. It is up to the IUT supplier to take the necessary precautions to avoid any impact on the test result.

4.3.3 Test case execution sequence

There is no restriction concerning the execution sequence of the DLL test cases, but to facilitate the analysis of the test results the following test sequence should be applied:

Protocol groups: LAPV5-EF ⇒ LAPV5-DL.

Test groups: IT ⇒ CA ⇒ TI ⇒ BV ⇒ BO ⇒ BI.

5 Untestable test purposes

This clause contains a list of TPs which are not covered by the ATS due to the chosen ATM or other restrictions.

The following TPs are not implemented because they can be only tested under load conditions. It is assumed that a possible target conformance test system will not have the capacity to generate load.

Table 2: Unimplemented TPs

Test Purpose ID	Reference to ETS 300 324-7 [3]
TP23S5003	Refer to subclause 5.3.3.2.1
TP23S7014	Refer to subclause 5.3.3.3.1