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Integrated Services Digital Network (ISDN); Narrowband Multi-service Delivery System (NMDS); Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network layer (LE side)

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**Integrated Services Digital Network (ISDN);
Narrowband Multi-service Delivery System (NMDS);
Part 5: Test Suite Structure and Test Purposes (TSS&TP)
specification for the network layer (LE side)**

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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 5 of a multi-part deliverable covering the Integrated Services Digital Network (ISDN); Narrowband Multi-service Delivery System (NMDS), as identified below:

- Part 1: "NMDS interface specification";
- Part 2: "Protocol Implementation Conformance Statement (PICS) proforma specification";
- Part 3: "Test Suite Structure and Test Purposes (TSS&TP) specification for the data link layer (NTN side)";
- Part 4: "Test Suite Structure and Test Purposes (TSS&TP) specification for the network layer (NTN 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) specification for the NMDS Layer 2 PSTN-GW function (NTN side)";
- Part 7: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) specification for the PSTN NMDS interface Layer 3 (NTN side)";
- Part 8: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) specification for the PSTN NMDS interface Layer 3 (LE side)".

National transposition dates

Date of adoption of this EN:	8 February 2002
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1 Scope

The present document contains the Test Suite Structure (TSS) and Test Purposes (TPs) for the Network layer (LE side) of a NMDS interface.

The objective of the present document is to provide conformance tests giving a high probability of inter-operability of a Network Termination Node (NTN) and a Local Exchange (LE) from different manufacturers over the NMDS interface. The present document covers only the procedures described in EN 301 141-1 [1].

ISO/IEC 9646-1 [7] is used as the basis for the methodology of conformance testing.

Concerning the Public Switched Telephone Network (PSTN) protocol testing, only the procedures defined in EN 301 141-1 [1] are covered by the tests defined in the present document. An Implementation Under Test (IUT), however, will have implemented a national PSTN protocol part as well. This requires that the tester generates messages containing the national PSTN protocol specific optional Information Elements (IEs), otherwise the IUT would not act on messages according to the PSTN protocol procedure definition. However, this does not provide a comprehensive test of the national PSTN protocol mapping specification, which is outside the scope of the present document.

As the tests use PSTN messages containing optional IEs according to national specifications, the test result is only valid for the implemented national mapping of the V5.1 PSTN protocol.

The present document does not cover tests related to functions of the bearer channel. Those functions should be tested in conjunction with testing of the national PSTN protocol mapping specification.

The present document contains no requirements concerning NWK tests for Integrated Services Digital Network Basic Access (ISDN-BA).

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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 and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [1] ETSI EN 301 141-1 (V2.1.1): "Integrated Services Digital Network (ISDN); Narrowband Multi-service Delivery System (NMDS); Part 1: NMDS interface specification".
- [2] ETSI EN 301 141-2 (V1.3.1): "Integrated Services Digital Network (ISDN); Narrowband Multi-service Delivery System (NMDS); Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".
- [3] ISO/IEC 7498-1: "Information technology - Open Systems Interconnection - Basic Reference Model: The Basic Model".
- [4] ISO/IEC 7498-2: "Information processing systems - Open Systems Interconnection - Basic Reference Model - Part 2: Security Architecture".
- [5] ISO/IEC 7498-3: "Information technology - Open Systems Interconnection - Basic Reference Model: Naming and addressing".
- [6] ISO/IEC 7498-4: "Information processing systems - Open Systems Interconnection - Basic Reference Model - Part 4: Management framework".
- [7] ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".

- [8] ETSI EN 300 324-1 (V1.2.3): "V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); Part 1: V5.1 interface specification".
- [9] ETSI ETS 300 402-2 (1995): "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 2: General protocol specification [ITU-T Recommendation Q.921 (1993), modified]".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in EN 300 324-1 [8] and the following apply:

Abstract Test Case (ATC): Refer to ISO/IEC 9646-1 [7].

Abstract Test Suite (ATS): Refer to ISO/IEC 9646-1 [7].

data link layer: Refer to ISO/IEC 7498 [3] to [6].

implementation under test: Refer to ISO/IEC 9646-1 [7].

incorrect information element: specified information element carrying information element types not defined in EN 301 141-1 nor in EN 300 324-1

invalid PSTN information element: PSTN information element not according to national specific requirements

invalid Protocol Data Unit: PDU which contains incorrect message format

invalid PSTN message: PSTN message carrying information elements not according to national specific requirements

lower tester: Refer to ISO/IEC 9646-1 [7]. [SIST EN 301 141-5 V1.1.1:2005
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network layer: Refer to ISO/IEC 7498 [3] to [6].

network termination: equipment providing the network side at the ISDN user-network interface for the basic access

NOTE: This term is used in the present document to indicate network-terminating aspects of NT1 and NT2.

physical layer: Refer to ISO/IEC 7498 [3] to [6].

Protocol Implementation Conformance Statement: Refer to ISO/IEC 9646-1 [7].

PICS proforma: Refer to ISO/IEC 9646-1 [7].

specified information element: information element identifier defined in EN 300 324-1

System Under Test (SUT): Refer to ISO/IEC 9646-1 [7].

Test Purpose (TP): Refer to ISO/IEC 9646-1 [7].

unspecified Information Element: information element identifier not defined in EN 301 141-1 nor in EN 300 324-1

valid information element: PSTN information element according to national specific requirements

valid PSTN message: PSTN message carrying information elements according to national specific requirements

3.2 Abbreviations

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

AN	Access Network
ATC	Abstract Test Case
ATS	Abstract Test Suite
FE	Function Element
FSM	Finite State Machine
IE	Information Element
ISDN	Integrated Services Digital Network
ISDN-BA	ISDN Basic Access
IUT	Implementation Under Test
L3addr	Layer 3 address
LE	Local Exchange
NWK	NetWorK layer
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statements
PL	Permanent Line
PSTN	Public Switched Telephone Network
SUT	System Under Test
TI	Timer
TP	Test Purpose
TSS	Test Suite Structure
UNI	User Network Interface

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4 Test Suite Structure (TSS)

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4.1 TSS overview

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Figure 1 shows the structure of the NTN side NMDS test suite.

- NMDS_LE
 - PSTN
 - Valid
 - PSTN FSM LE States (LE1, LE2, LE4, LE5)
 - Inopportune
 - PSTN FSM LE States (LE1, LE2, LE4, LE5)
 - Syntactically Invalid
 - PSTN FSM LE States (LE1, LE2, LE4, LE5)
 - Timers
 - PSTN FSM LE States (LE1, LE2, LE4, LE5)
 - ISDN
 - Valid
 - Syntactically Invalid
 - Timers

Figure 1: NMDS LE TSS

4.2 Test groups

4.2.1 Protocol groups

4.2.1.1 PSTN protocol

All tests in the PSTN protocol (NMDS_LE/PSTN) test group are intended to verify as thoroughly as possible the various procedures of the LE_PSTN_protocol entity.

The following PSTN procedures are covered:

- all path related normal operation procedures;
- significant path related exceptional procedures;
- the status enquiry procedure;
- the error handling procedures;
- the layer 3 error detection procedure.

4.2.1.2 ISDN maintenance protocol

All tests in the ISDN protocol (NMDS_LE/ISDN) test group are intended to verify as thoroughly as possible the various procedures of the NTN_ISDN_protocol entity.

The following ISDN procedures are covered:

- the status enquiry procedure;
- the error handling procedures.

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4.2.2 Main test groups

4.2.2.1 Valid Behaviour (V) tests

Predefined state transitions are considered as valid. The test purpose in the Valid Behaviour test subgroup covers as far as reasonable the verification of the normal and exceptional procedures of the various FSMs.

A valid test is a test where the message sequence and the message contents are considered as valid (no error indication shall be indicated).

4.2.2.2 Inopportune Behaviour (I) tests

This test subgroup is intended to verify that the IUT is able to react properly in the case an inopportune protocol event occurring. Such an event is syntactically correct but occurs when it is not expected and an error indication is caused.

4.2.2.3 Syntactically Invalid Behaviour (S) tests

This test subgroup is intended to verify that the IUT is able to react properly having received an invalid PDU. An invalid PDU is defined as a syntactically incorrect message and therefore an error indication is caused.

4.2.2.4 Timer (T) expiry and counter mismatch tests

Different timers and counters are defined to supervise the various state transitions.

4.3 Test step structure

General dynamic behaviours are described in test steps which can be called from all ATCs within the ATS:

- state transitions
- preconditions
- preambles
- postambles
- status checks
- common behaviours

4.3.1 State transitions

The following clauses identify the test steps used in the ATS. In general, each test step represents a state transition. For example in the PSTN protocol, PSTN_LE1_2 is the test step which brings the LE PSTN_protocol_FSM from PSTN_path_state LE1 to PSTN_path_state LE2. The state transitions are declared in the parenthesis (originating state - destination state) which follow the test step names.

PSTN: state transitions used to preamble and postamble the PSTN protocol before and after a test purpose can be performed.

To test the NMDS interface certain sequences (i.e. preamble) shall be executed to reach the state which is the subject for the TPs.

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4.3.1.1 PSTN protocol (standards.iteh.ai)

Refer to EN 301 141-1 [1] and EN 300 324-1 [8].

All messages sent within the test steps shall be valid PSTN messages.

4.3.2 Preconditions

The precondition step of a test group applies at the UP via the user interface as a Permanent Line (PL) condition. This line condition shall be permanent during all tests in that test group.

4.3.3 Preambles

The preamble test step group contains the test steps needed for initialization of the IUT before testing the particular test purpose. All combinations of the test steps defined in clause 4.3.1.1 can be used to create preambles. Each preamble shall start from the IUT initial state as defined in clause 5.1.5.

4.3.4 Postambles

After each ATC the IUT shall be brought back to the initial state as defined in clause 5.1.5. All combinations of the test steps defined in clauses 4.3.1.2 to 4.3.1.5 can be used to create postambles.

4.3.5 Status verification

4.3.5.1 PSTN protocol

Based on EN 301 141-1 [1] and EN 300 324-1 [8], table 29, it is possible to identify the state of the IUT PSTN protocol FSM with valid PSTN messages.

On receipt of a STATUS ENQUIRY message the IUT shall send a STATUS message and remain the same state.