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Integrated Services Digital Network (ISDN); Narrowband Multi-service Delivery System (NMDS); Part 3: Test Suite Structure and Test Purposes (TSS&TP) specification for the data link layer (NTN 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 3 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 defines requirements to support the Narrowband Multi-service Delivery System (NMDS) which provides interfaces connected via a Network Termination Node (NTN) to a Local Exchange (LE), in order to support existing PSTN and ISDN-BA services over an existing ISDN-Basic Access digital subscriber line (DSL).

The present document contains the Test Suite Structure (TSS) and Test Purposes (TPs) for the data link layer (NTN side only) of an NMDS interface. The LE layer 2 state machine is as per ETS 300 402-2 [5].

The present document also contains requirements relating to the functionality of a (new) Network Termination Node (NTN) for supporting both Public Switched Telephone Network (PSTN) access and Integrated Services Digital Network - Basic Access (ISDN-BA) S/T reference point interfaces over a single (digital section) transmission system as used for an existing ISDN-BA. The NTN encompasses NT2-like (noted NT2*) functionality, physical PSTN user port(s), and PSTN protocol functionality.

An NMDS implementation may contain one ISDN-BA port and/or a limited number of PSTN ports up to a maximum of 10. Typically one or two PSTN ports would be supported.

The objective of the present document is to provide conformance test purposes giving a high probability of inter-operability of a Network Termination Node (NTN) and a Local Exchange (LE) on the DLL 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 [11] is used as the basis for the methodology of conformance testing.

EN 301 141-1 [1] defines the NMDS layer 2 functions:

- For the ISDN-BA layer 2 functions, point-to-point (i.e. TEI 0) or point-to-multipoint procedures may be supported using the full ISDN TEI assignment procedures as currently defined. These include TEI assignment and removal procedures. However, there is an NMDS-specific constraint. TEI values 117 through 126 are now reserved for the PSTN_GW layer 2 frames and shall not be used for the ISDN_BA frames. Thus, the DLL TSS and TP as given in ETS 300 402-6 [6] apply as well to the NMDS interface for the ISDN-BA layer 2. The present document does not repeat them.
- For the PSTN layer 2 functions, EN 301 141-1 [1] presents two different state machines. The NTN DLL state machine is an adaptation of the ISDN DSS1 protocol data link layer in ETS 300 402-2 [5]. The LE layer 2 state machine shall be as per ETS 300 402-2 [5]. The present document contains the PSTN layer 2 TSS and TP for the NTN side only.
- The ISDN-BA and PSTN layer 2 functions both use ISDN layer 2 frame formats shown in figure 1/Q.921 of ETS 300 125 [4].

The present document contains no requirements concerning data link layer test purposes for the ISDN-BA component of the NMDS when provisioned.

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] ETSI ETS 300 324-1 (1994): "V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); Part 1: V5.1 interface specification".
- [4] ETSI 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".
- [5] 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]".
- [6] ETSI ETS 300 402-6 (1997): "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 6: Test Suite Structure and Test Purposes (TSS&TP) specification for the general protocol".
<https://standards.iteh.ai/catalog/standards/sist/db1e9f8-5509-469f-b515-501111111111>
- [7] ISO/IEC 7498-1: "Information technology - Open Systems Interconnection - Basic Reference Model: The Basic Model".
- [8] ISO/IEC 7498-2: "Information processing systems - Open Systems Interconnection - Basic Reference Model - Part 2: Security Architecture".
- [9] ISO/IEC 7498-3: "Information technology - Open Systems Interconnection - Basic Reference Model: Naming and addressing".
- [10] ISO/IEC 7498-4: "Information processing systems - Open Systems Interconnection - Basic Reference Model - Part 4: Management framework".
- [11] ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETS 300 324-1 [3] and the following apply:

abstract test suite: See ISO/IEC 9646-1 [11].

data link layer: See ISO/IEC 7498 [7] to [10].

implementation under test: See ISO/IEC 9646-1 [11].

lower tester: See ISO/IEC 9646-1 [11].

network layer: See ISO/IEC 7498 [7] to [10].

notional upper tester: the upper layers of the System Under Test (SUT) realize the functions of the UT without any additional mechanism being installed

physical layer: See ISO/IEC 7498 [7] to [10].

point of control and observation: See ISO/IEC 9646-1 [11].

Protocol Implementation Conformance Statement (PICS): See ISO/IEC 9646-1 [11].

PICS proforma: See ISO/IEC 9646-1 [11].

Protocol Implementation eXtra Information for Testing (PIXIT): See ISO/IEC 9646-1 [11].

PIXIT proforma: See ISO/IEC 9646-1 [11].

system under test: See ISO/IEC 9646-1 [11].

3.2 Abbreviations

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

AN	Access Network
ATS	Abstract Test Suite
BI	Syntactically Behaviour
BV	Valid Behaviour
DLL	Data Link Layer
FCS	Frame Check Sequence
ISDN	Integrated Services Digital Network
ISDN-BA	Integrated Services Digital Network-Basic Access
IUT	Implementation Under Test
LE	Local Exchange
NMDS	Narrowband Multi-service Delivery System
NTN	Network Termination Node
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PSTN	Public Switched Telephone Network
SAPI	Service Access Point Identifier
SUT	System Under Test
TEI	Terminal Endpoint Identifier
TI	Timer
TP	Test Purpose
TSS	Test Suite Structure
UT	Upper Tester

4 Test Suite Structure (TSS)

4.1 TSS overview

Figure 1 shows the structure of the NMDS DLL test suite for the PSTN part of the NMDS interface. ETS 300 402-6 [6] gives the structure for the ISDN-BA part.

4.2 Test Suite Structure (TSS) details

- Layer management
 - DL state 9
 - Inopportune behaviour
 - Syntactically invalid
 - DL state 7.0
 - Valid behaviour
 - Inopportune behaviour
 - Syntactically invalid
 - DL state 8.0
 - Valid behaviour
 - Inopportune behaviour
- Data control
 - DL state 9
 - Valid behaviour
 - Inopportune behaviour
 - Syntactically invalid
 - DL state 5.1
 - Valid behaviour
 - DL state 7.0
 - Valid behaviour
 - Inopportune behaviour
 - Syntactically invalid
 - Outstanding I frames
 - Valid behaviour
 - Inopportune behaviour
 - Timers
 - DL state 7.1
 - Valid behaviour
 - Inopportune behaviour
 - DL state 7.4
 - Valid behaviour
 - Inopportune behaviour
 - Syntactically invalid
 - Outstanding I frames
 - Valid behaviour
 - Inopportune behaviour
 - Timers
 - DL state 7.5
 - Valid behaviour
 - Inopportune behaviour
 - DL state 8.0
 - Valid behaviour
 - Inopportune behaviour
 - Syntactically invalid
 - Outstanding I frames
 - Valid behaviour
 - Inopportune behaviour
 - Timers
 - Counters

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- DL state 8.1
 - Valid behaviour
 - Inopportune behaviour
- DL state 8.4
 - Valid behaviour
 - Inopportune behaviour
 - Syntactically invalid
 - Outstanding I frames
 - Valid behaviour
 - Inopportune behaviour
 - Timers
 - Counters
- DL state 8.5
 - Valid behaviour
 - Inopportune behaviour
- Multiple Ports

Figure 1: Test suite structure

5 Test Purposes (TP)

5.1 Test purpose naming convention

For each test requirement, a TP is defined.

TPs are numbered, starting at 001, within each group. Groups are organized according to the TSS. Additional references are added to identify the actual test suite (see table 1).

Table 1: TP identifier naming convention scheme

Identifier:	<suite><side><category><state><group><n>	
<suite>	= suite	L2 = layer 2
<side>	= side	U = user
<category>	= procedure category	L Layer management D Data control M Multiple ports
<state>	= data link entity state	e.g.: 70, 9, 81, etc.
<group>	= group	one character representing group reference according to TSS: V: Valid behaviour I: Inopportune behaviour S: Syntactically incorrect behaviour T: timers C: counters
<n>	= sequential number	(1-99)

5.2 Test groups

5.2.1 Protocol groups

5.2.1.1 Layer Management for the NMDS PSTN-GW Ports

The test purposes cover the basic NTN functions required by the PSTN-GW part of the NMDS interface upon receipt of TEI assignment and management messages. In fact, the NMDS has no layer management functions. This test group checks the NTN's response to layer management directives received from the LE. The responses are derived from the revised state table per clause 6.2 of EN 301 141-1 [1]. The tests check the following:

- Correct response upon reception of inopportune UI-frames.
- Correct handling of the largest size possible I-frame.
- Correct handling of syntactically incorrect frames.

5.2.1.2 Data Control over the NMDS PSTN-GW Ports

The test purposes cover the data link functions required for the NMDS interface's PSTN part (see EN 301 141-1 [1], clause 6).

5.2.1.3 Multiple ports

The test purposes cover the data link functions required for the NMDS interface for the following two port configurations:

- 1) Multiple PSTN ports assigned TEIs in descending order starting from TEI = 126.
- 2) One ISDN-BA port using automatic TEI determination and one PSTN port assigned TEI 126.

5.2.2 Main test groups

5.2.2.1 Valid Behaviour (V) tests

The BV subgroup contains test purposes for valid message sequences and contents.

5.2.2.2 Inopportune Behaviour (I) tests

This test subgroup verifies that the IUT reacts properly when an inopportune protocol event occurs. Such an event is syntactically correct but it occurs unexpectedly.

5.2.2.3 Syntactically Incorrect Behaviour (S) tests

The BI subgroup verifies the IUT's proper reaction when receiving a syntactically incorrect Protocol Data Unit (PDU).

5.2.2.4 Timer (T)

The TI test group contains tests related to the system timer T200.

5.2.2.5 Counters (C)

The TI test group contains tests related to the system counter N200.