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Digitalno omreģje z integriranimi storitvami (ISDN) ï Ozkopasovni veļ storitveni dostavni sistem (NMDS) ï 1. del: Specifikacija vmesnika NMDS

Integrated Services Digital Network (ISDN); Narrowband Multi-service Delivery System (NMDS); Part 1: NMDS interface specification

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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 1 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 user";

Part 4: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user".

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Date of adoption of this EN:	27 October 2000
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Introduction

The present document specifies the provision of Public Switched Telephone Network (PSTN) services over an existing Integrated Services Digital Network - Basic Access (ISDN-BA) digital subscriber line (DSL). Today PSTN terminals - normal telephones - can be connected to the S/T-interface via a Terminal Adapter (TA) with the support of services that can be mapped at a feasible cost from ISDN (principally the basic call services).

1 Scope

The present standard 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 services over an existing ISDN-Basic Access digital subscriber line (DSL).

The Narrowband Multi-Service Delivery System (NMDS) may also be connected via a V5 interface Access Network (AN) to a Local Exchange (LE) in order to provide existing PSTN and ISDN services. This optional arrangement is described in annex D which identifies two alternative methods to provide the same overall functionality.

The present document also contains requirements which relate 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 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. Typically one or two PSTN ports would be supported.

In order to maintain an evolutionary path for PSTN services, the national V5 PSTN protocol mapping is assumed to exist and forms an integral part of this specification.

NOTE: It is an underlying principle of the present document that, wherever practicable, steps may be taken to minimize the cost of the NTN, subject to maintaining the required functionality.

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 ETR 080 (1996): "Transmission and Multiplexing (TM); Integrated Services Digital Network (ISDN) basic rate access; Digital transmission system on metallic local lines".

[2] ETSI ETS 300 012-1 (1996): "Integrated Services Digital Network (ISDN); Basic User-Network Interface (UNI); Part 1: Layer 1 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 300 347-1 (1994): "V interfaces at the digital Local Exchange (LE); V5.2 interface for the support of Access Network (AN); Part 1: V5.2 interface specification".

[5] ETSI ETS 300 402-2: "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] ITU-T Recommendation I.412 (1988): "ISDN user-network interfaces - Interface structures and access capabilities".

[7] ETSI EN 301 141-2 (V1.2): "Integrated Services Digital Network (ISDN); Narrowband Multi-service Delivery System (NMDS); Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

[8] ITU-T Recommendation M.3603 (1992): "Application of maintenance principles to ISDN basic rate access".

[9] ITU-T Recommendation M.3602 (1992): "Application of maintenance principles to ISDN subscriber installations".

[10] ETSI ETS 300 297 (1995): "Integrated Services Digital Network (ISDN); Access digital section for ISDN basic access".

3 Definitions and abbreviations

3.1 Definitions

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

Narrowband Multi-service Delivery System: system that provides an interface to the network directly to the LE or via an AN to support existing PSTN and ISDN services over an ISDN-BA DSL.

Network Termination Node: functional group on the user side of the digital section (NMDS interface noted T* reference point) that includes functionality to support an ISDN-BA port and/or one or more PSTN ports.

Network Termination Type 2 *: functional group within the NTN which, at the user side of the T* reference point, performs the PSTN layer 2 and the ISDN layer 2 multiplexing and demultiplexing over the D channel, and only interprets (and then relays) the layer 3 messages to switch the B channels to the ISDN access and the PSTN Gateways as instructed by the signalling messages.

PSTN-Gateway: functional group within the NTN which terminates the PSTN interface at the NTN.

T* reference point: reference point which provides access to the NMDS, between the network termination of the digital section (NT1) and the Network Termination Node functional group.

V1* reference point: V1 reference point with the addition of PSTN functionality required to support the NMDS.

3.2 Abbreviations

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

AN	Access Network
BCC	Bearer Channel Control
CPE	Customer Premises Equipment
DLCI	Data Link Connection Identifier
DSL	Digital Subscriber Line
DTMF	Dual Tone Multi-Frequency
ISDN	Integrated Services Digital Network
ISDN-BA	Integrated Services Digital Network - Basic Access
LE	Local Exchange
NMDS	Narrowband Multi-service Delivery System
NT	Network Termination
NT1	NT type 1 (see ETR 080 [1])
NT2*	Network Termination Type 2* (see the definition in subclause 3.1 above)
NTN	Network Termination Node
NWK	Network Layer
PSTN	Public Switched Telephone Network
PSTN-GW	PSTN Gateway
SAPI	Service Access Point Identifier
TA	Terminal Adapter

TE	Terminal Equipment
TEI	Terminal Endpoint Identifier
UNI	User Network Interface

4 General description

The purpose of the NMDS is to support both ISDN-BA and one or more PSTN user ports in the same manner such that they appear to the user as if they were directly connected to the LE. The support of ISDN-BA user ports utilizes the same type of functions as used by an NT1 defined in ETR 080 [1], whilst PSTN user ports are supported using the same PSTN protocol as defined in the V5.1 interface standard ETS 300 324-1 [3] with some modifications.

The LE is service responsible for and controls the tones (voice messages etc.) sent and received over the NMDS. See figure 1 for the functional architecture of NMDS.

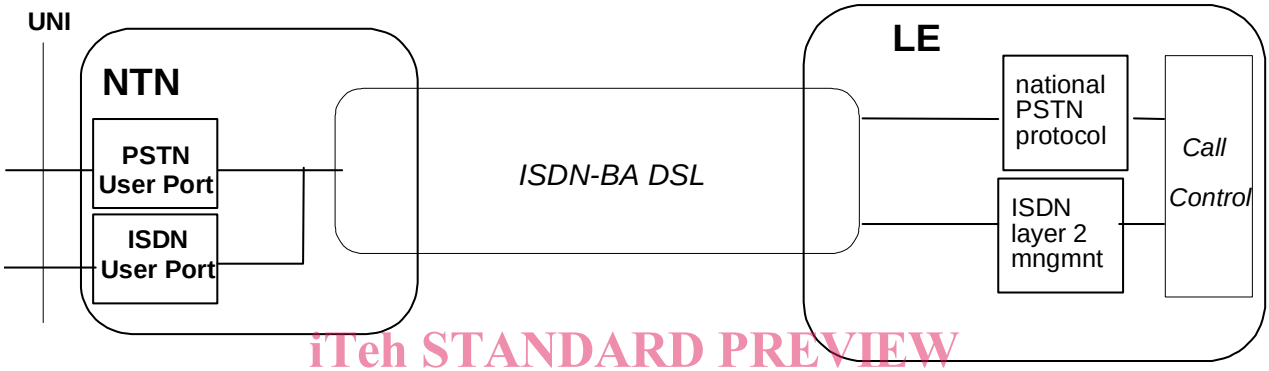


Figure 1: General NMDS functional diagram

The Narrowband Multi-service Delivery System (NMDS) is defined at the T* reference point and the complementary V1* reference point as shown in figure 2.

On any NMDS, the LE may support up to 10 PSTN (analogue) lines and the NTN may provide up to 10 PSTN (analogue) access ports. The provision of PSTN and ISDN access ports in the LE requires a bilateral agreement between the user and the service provider at subscription time.

5 Layer 1 functions

- Structure

  The general access structure is described in ITU-T Recommendation I.412 [6]. The access structure for ISDN-BA in ITU-T Recommendation I.412 [6] is valid also for the PSTN application. The layer 1 transporting the full NMDS functionality from the NTN to the LE shall be an ISDN-BA layer 1.

- ISDN-BA Digital Section

  In order to permit transparent operation via an AN, there shall be no changes to the ISDN-BA digital section layer 1 protocols.

- ISDN-BA UNI

  Layer 1 at the ISDN-BA UNI shall be in accordance with ETS 300 012-1 [2].

- Activation Procedures

  - NTN

    The NTN shall permit layer 1 activation from the ISDN UNI and layer 1 activation/deactivation from the network. In order to keep the NTN simple, the PSTN gateway shall not require "user side" activation procedures.

The NTN shall also allow the digital section to be activated regardless of the electrical conditions prevailing at the ISDN UNI and PSTN port.

Once the layer 1 is activated the NTN shall always transmit the ACT bit set to 1 towards the network. This is to prevent the possibility of the LE/AN deactivating the digital section as part of the recovery actions resulting from an ISDN UNI error. (Details of the ACT bit can be found in ETR 080 [1] annex A figure A.3 and subclause A.8.3.2.2. Its purpose is to indicate readiness for layer 2.)

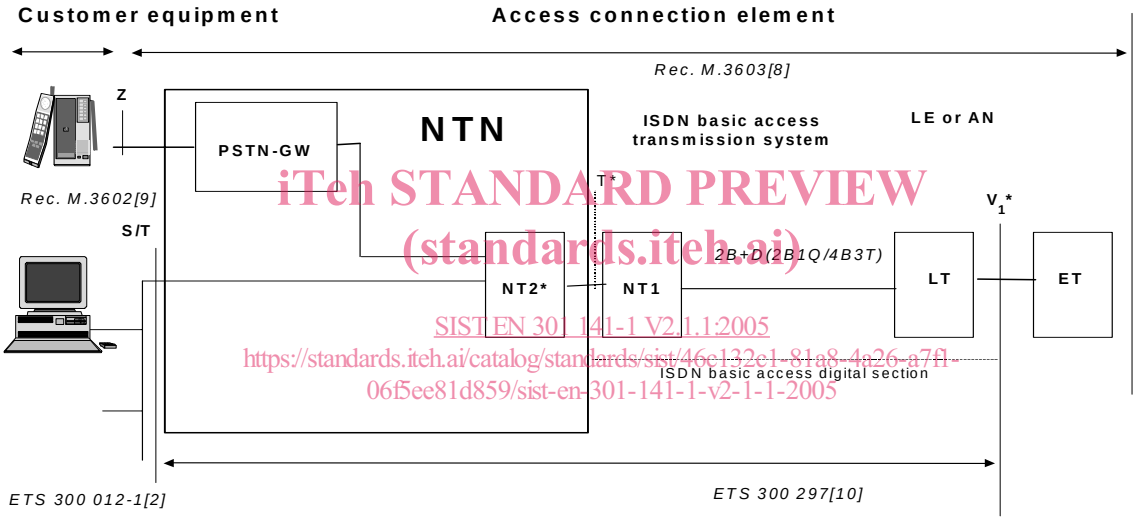
- LE/AN

  The network shall maintain the digital section in a permanently activated state whenever the PSTN protocols are to be supported.

  The permanent activation of the digital section may interfere with certain maintenance operations normally provided over the embedded operations channel. The LE shall be able to detect the activation state of the ISDN UNI which would have prevailed if the PSTN ports had not been present, using a message-based maintenance mechanism at layer 3 (see subclause 7.3.1.2).

- Diagnostics

  The NTN shall support full ISDN layer 1 diagnostic loop capability.



NOTE: The functionality and layout shown in figure 2 can only be one particular example and is not representative of all architectures where NMDS can be applied.
In actual implementations the NT1 functional group is likely to be physically integrated in an equipment realizing the NTN functionality.

Figure 2: An example of an NMDS scenario for NMDS

5.1 Powering Aspects

5.1.1 Power available from the transmission system

The power available for NMDS support is the actual power budget provided by the existing ISDN-BA digital section. Additional power is expected to be provided locally to the NTN. What may happen under local power fail conditions with respect to NTN user ports is described below. Hence there are no deviations from the requirements specified in the ISDN-BA standards in order to support NMDS.

5.1.2 NMDS behaviour under power fail conditions

The ISDN-BA UNI standard (ETS 300 012-1 [2]) describes a potential requirement that a designated instrument may be made available on an S/T Interface. If this designated instrument is available, then it shall be capable of (at least) making emergency telephone calls.

For the PSTN, the situation is not mandated on a European wide basis and depends upon nationally agreed regulations which are outside the scope of the present document.

The NMDS may be comprised of one or more PSTN ports, potentially as well as an ISDN-BA port. Hence it is not possible to define in a standard mandatory behaviour under power-fail conditions. What is more relevant is that manufacturers are able to adequately define their system's behaviour under power failure conditions. For this reason, a clause has been inserted into the Protocol Implementation Conformance Statement (PICS) document, EN 301 141-2 [7], where such behaviour may be explained.

6 Layer 2 functions

6.1 Overview

The layer 2 used within the NMDS system, used for both PSTN and ISDN-BA services, shall be in accordance with ETS 300 402-2 [5] but with the following restrictions.

The LE layer 2 state machine shall be as per ETS 300 402-2 [5].

The PSTN gateway layer 2 state machine shall be as defined in subclause 6.2 of the present document, providing a restricted functionality version of the state machine in ETS 300 402-2 [5].

The PSTN gateway shall use a single permanently activated data link with a fixed Data Link Connection Identifier (DLCI) for all communication with the network. The DLCI shall consist of a PSTN Terminal Endpoint Identifier (TEI) allocated from the automatic TEI values (i.e. 64-126) and Service Access Point Identifier (SAPI) set equal to 0. TEI values 117 to 126 shall be reserved for PSTN use when NMDS is implemented on an access.

The first PSTN gateway to be fitted shall use TEI 126 and be identified as Line 1. TEI values 117 to 125 are reserved for further PSTN gateways, lines 2 to 10, as shown in the table 1.

Table 1: Allocation of TEI to PSTN ports

TEI value	Line number
126	1
125	2
124	3
123	4
122	5
121	6
120	7
119	8
118	9
117	10

The PSTN gateway shall not support the broadcast data link, or TEI management procedures, and shall not initiate layer 2 establishment, i.e. the DL_ESTABLISH_REQUEST primitive in the TEI assigned state shall not be supported.

On the ISDN port, 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, some previously available values are now reserved (see table 1).

It is expected that some implementations may provide additional PSTN-GWs either as separate equipment connected to the S/T Interface or as further integrated entities. In each case the TEI allocations shall comply with those shown in table 1. The TEI associated with each external PSTN-GW shall be preprovisioned.

6.2 PSTN-GW layer 2 state machine modifications

The modifications required to the BA layer 2 state machine for the PSTN-GW are specified below as a list of differences to the state machine contained in annex D of ETS 300 402-2 [5].

Delete states 1, 2, 3, 5.0, 5.2 and 6.

Delete the following input events:

- DL-ESTABLISH-REQUEST;
- DL-RELEASE-REQUEST;
- DL-UNIT DATA-REQUEST;
- UI FRAME IN QUEUE;
- MDL-ASSIGN-REQUEST;
- MDL-REMOVE-REQUEST;
- MDL-ERROR-RESPONSE;
- T203 TIME-OUT.

Renumber state 4, and all references to it, to state 9; rename the state to "LINK NOT ESTABLISHED".

Delete all instances of the following output events replacing the event with "-" if it was the only action associated with the input event/state combination under consideration:

- DISC UI QUEUE;
- START T203;
- STOP T203;
- RESTART T203;

- MDL-ERR-IND(all variants);
- DL-UNIT-DATA-IND.

Replace all instances of "DISC I and UI QUEUES" with "DISC I QUEUE".

For input event "T200 TIME-OUT" in states 7.0 through to state 7.3 delete the "either" option.

For input event "T200 TIME-OUT; RC<N200; V(A)<V(S)" in states 8.0 through to state 8.3 delete the "either" option.

Replace all instances of DL-EST-IND and DL-REL-IND with MDL-EST-IND and MDL-REL-IND respectively.

Replace the action for input event "DM F=0 able to enter state 7.0" in state 9 with "-".

6.3 PSTN layer 2 activation

After installing the NTN, the PSTN-GW part of the NTN shall wait for activation from the network. As soon as layer 1 is activated, the LE shall be in a position to attempt layer 2 establishment of the PSTN-GW as and when required (as immediate service provision may not be required).

Loss of power and resumption of power on the DSL shall force a reset of the PSTN-GW functionality to the idle condition.