SLOVENSKI STANDARD
SIST EN 301 005-4:2001

01-september-2001

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V interfaces at the digital Service Node (SN); Interfaces at the VB5.1 reference point for the support of broadband or combined narrowband and broadband Access Networks (ANs); Part 4: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification

Ta slovenski standard je istoveten z: **EN 301 005-4 Version 1.1.2**

ICS:

35.200	Vmesniška in povezovalna oprema	Interface and interconnection equipment

SIST EN 301 005-4:2001   **en**

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ETSI EN 301 005-4 V1.1.2 (2000-05)

European Standard (Telecommunications series)

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ETSI

Reference
DEN/SPS-09046-4

Keywords
AN, B-ISDN, ISDN, SN, PSTN, V interface,
V5 interface, VB5 interface, ATS, PIXIT

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00   Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Signalling Protocols and Switching (SPS).

The present document is part 4 of a multi-part EN covering V interfaces at the digital Service Node (SN); Interfaces at the VB5.1 reference point for the support of broadband or combined narrowband and broadband Access Networks (ANs) as identified below:

Part 1: "Interface specification";

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

Part 3: "Test Suite Structure and Test Purposes (TSS&TP) specification";

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

National transposition dates	
Date of adoption of this EN:	28 April 2000
Date of latest announcement of this EN (doa):	31 July 2000
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

Introduction

General

The work on a new broadband VB reference point concept was initiated by ETSI Technical Committee SPS to consider possible new structures and reference points for the connection of new broadband and combined narrowband/broadband access arrangements to Service Nodes (SN), in co-operation with other TCs.

The VB5 reference point concept, based on ITU-T Recommendation G.902 [8], was split into two variants. The first variant based on an ATM cross-connect with provisioned connectivity, called the VB5.1 reference point, is described in the present document. The other variant which further enables on-demand connectivity within the AN, called the VB5.2 reference point, is covered by EN 301 217-1 [10].

Relationship between the VB5.1 and VB5.2 reference point concepts

VB5.2 extends the capabilities at the VB5.1 reference point to include on-demand connectivity in the AN under the control of SN. The major common features between the VB5.1 and VB5.2 interfaces are:

-   both VB5 interfaces support B-ISDN as well as narrowband and other non-B-ISDN customer access types;

-   both VB5 interfaces support ATM multiplexing/cross-connecting in the AN at the VP and/or VC level.

It is anticipated that the Real Time Management Co-ordination (RTMC) protocol for the VB5.1 reference point will be a subset of the RTMC protocol for the VB5.2 reference point.

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1   Scope

The present document specifies the Abstract Test Suite (ATS), the Abstract Test Method (ATM), ATS conventions, the partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma for testing the conformity of an implementation to the specification of interfaces at the VB5.1 reference point between an Access Network (AN) and a Service Node (SN). A proforma for the testing report (PCTR) is also included.

There are in fact two separate test suites, as well as two PCTR proformas, one version for testing the AN, the other one for testing the SN.

The ATS is based on the Test Suite Specification & Test Purposes specified in EN 301 005-3 [3].

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 EN 301 005-1 (V1.1): "V interfaces at the digital Service Node (SN); Interfaces at the VB5.1 reference point for the support of broadband or combined narrowband and broadband Access Networks (ANs); Part 1: Interface specification".

[2]   ETSI EN 301 005-2 (V1.1): "V interfaces at the digital Service Node (SN); Interfaces at the VB5.1 reference point for the support of broadband or combined narrowband and broadband Access Networks (ANs); Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

[3]   ETSI EN 301 005-3 (V1.1): "V interfaces at the digital Service Node (SN); Interfaces at the VB5.1 reference point for the support of broadband or combined narrowband and broadband Access Networks (ANs); Part 3: Test Suite Structure and Test Purposes (TSS&TP) specification".

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

[5]   ISO/IEC 9646-2: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract test suite specification".

[6]   ISO/IEC 9646-3: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The Tree and Tabular Combined Notation (TTCN)".

[7]   ISO/IEC 9646-6: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 6: Protocol profile test specification".

[8]   ITU-T Recommendation G.902: "Framework Recommendation on functional access networks (AN) - Architecture and functions, access types, management and service node aspects".

[9]   ITU-T Recommendation M.3010: "Principles for a Telecommunications management network".

[10]   ETSI EN 301 217-1: "V interfaces at the digital Service Node (SN); Interfaces at the VB5.2 reference point for the support of broadband or combined narrowband and broadband Access Networks (ANs); Part 1: Interface specification".

3   Definitions and abbreviations

3.1   Definitions

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

-   terms defined in EN 301 005-1 [1];

-   terms defined in ISO/IEC 9646-1 [4] and in ISO/IEC 9646-2 [5].

In particular, the following terms defined in ISO/IEC 9646 apply:

Abstract Test Suite (ATS)
Abstract Test Method (ATM)
Implementation Conformance Statement (ICS)
Implementation Under Test (IUT)
Implementation eXtra Information for Testing (IXIT)
Lower Tester (LT)
PICS proforma
PIXIT proforma
Point of Control and Observation (PCO)
Protocol Implementation Conformance Statement (PICS)
Protocol Implementation eXtra Information for Testing (PIXIT)
Service Access Point (SAP)
Single Party Testing (SPyT)
System Under Test (SUT)
Upper Tester (UT)
TTCN.GR
TTCN.MP
Protocol Conformance Test Report (PCTR)
PCTR proforma

3.2   Abbreviations

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

AAL	ATM Adaptation Layer
AAL-SAP	AAL - Service Access Point
AN	Access Network
ATM	Asynchronous Transfer Mode
B-ISDN	Broadband ISDN
B-ISUP	Broadband ISDN Signalling User Part
B-UNI	Broadband UNI
BA	Basic (rate) Access
CPE	Customer Premises Equipment
CPN	Customer Premises Network
ET	Equipment Terminal
FSM	Finite State Machine
ID	Identity
IE	Information Element
INI	Inter-Network Interface
ISDN	Integrated Services Digital Network
LAN	Local Area Network
LE	Local Exchange
LME	Layer Management Entity
LMI	Local Management Interface
LSP	Logical Service Port
LUP	Logical User Port
MIB	Management Information Base

MSC	Message Sequence Chart
N-ISDN	Narrowband ISDN
NNI	Network-to-Network Interface
OAM	Operations Administration and Maintenance
PDH	Plesiochronous Digital Hierarchy
PDU	Protocol Data Units
PSP	Physical Service Port
PSTN	Public Switched Telephone Network
PUP	Physical User Port
Q3	"Q" management interface reference point as ITU-T Recommendation M.3010 [9]
RTMC	Real Time Management Co-ordination
SAAL	Signalling ATM Adaptation Layer
SAP	Service Access Point
SAR	Segmentation and Reassembly
SDH	Synchronous Digital Hierarchy
SDL	Specification and Description Language
SDU	Service Data Units
SN	Service Node
SNI	Service Node Interface
SP	Service Port
SPS	Signalling Protocols and Switching
SSCF	Service Specific Co-ordination Function
SSCOP	Service Specific Connection Oriented Protocol
TC	Technical Committees
TE	Terminal Equipment
TMN	Telecommunication Management Network
TP	Transmission Path
UNI	User-Network Interface
VB	Broadband "V" reference point
VC	Virtual Channel (ATM)
VCE	Virtual Channel Entity
VP	Virtual Path
VPC	VP Connection
VPCI	VP Connection Identifier
VPCI-CC	VP Connection Identifier - Consistency Check
VPI	VP Identifier
VPL	VP Link

4   Test architecture

4.1   Abstract Test Method (ATM)

This subclause describes the Abstract Test Method (ATM) and the Point of Control and Observation (PCO) used to test the VB5.1 RTMC protocol for the AN and SN components.

The remote test method is used for VB5.1 RTMC conformance testing, since the VB5.1 implementations are not mandated to offer a direct access to the upper service boundary (i.e. to the "mee" service primitives). The co-ordination procedures can only be expressed in an informal way.
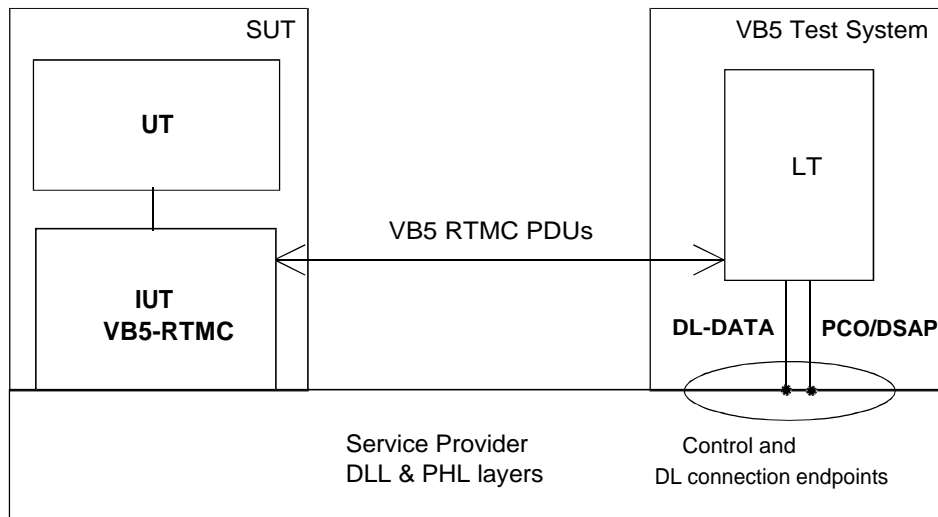
Figure 1: Remote single layer test method applied to the VB5.1 RTMC testing

LT: A Lower Tester (LT) is located in the VB5.1 test system. It controls and observes the behaviour of the IUT.

DSAP: A unique Data link Service Access Point (DSAP) is defined at the VB5.1 interface and commonly used for exchanging service data of the RTMC protocol functional entities.

PCO: The PCO for RTMC testing is located on the DSAP. All test events at the PCO are specified in terms of data link Abstract Service Primitives (ASPs) and network layer PDUs.

UT: No explicit Upper Tester (UT) exists in the test system. However, the SUT needs to carry out some UT functions to achieve some effects of test co-ordination procedures. Designing ATS, the capability of the system management functions, such as controls of the IUT, its interactions with the Q3 interface may be taken into account. The controls of the IUT will be implied or informally expressed in the ATS, but no assumption shall be made regarding their feasibility or realization. An example of such controls could be to provoke start up of the IUT through the Q3 interface.

VB5-RTMC: The PDU conveying this information will be transferred to and from the tester via a single, dedicated virtual connection.

4.2   Scope of test purposes and additional testing

Behaviour which cannot be fully controlled and observed via the RTMC protocol alone, such as the checking of completion of certain actions of the system on the managed resources, has been included, when appropriate, in individual VB5.1 test purposes in an additional requirement section.

Taking the example of blocking, a need may arise to verify that the status of a resource has actually been changed, as specified in the standard, by checking that it can no longer be allocated to a call. This may require the execution of a call attempt via the signalling protocols at a UNI or NNI. Such test purposes are not testable in the scope of the RTMC protocol alone. An architecture has to be defined for system level tests requiring the combination of two or more interfaces or protocols. Such tests are outside the scope of the ATS for RTMC. The approach taken is to append a short description of such requirements to the related RTMC test purposes.

The actual testing of these requirements can only be performed if additional means are provided to access internal data which cannot be interrogated via RTMC procedures. One way of performing this is to use an ad-hoc tester loaded into the SUT, if available. This is not typically the case. A generic approach is to consider that any system of the Network Element type comprises several interfaces and protocols, each of which is first tested at the individual protocol level. These tests typically have to leave out a number of requirements which are not testable within a single protocol.

A second hierarchical level of testing (see figure B2) could cover a substantial number of such requirements by checking interactions between two or more protocols which have passed individual conformance testing. This is however outside the scope of the present testing standard.
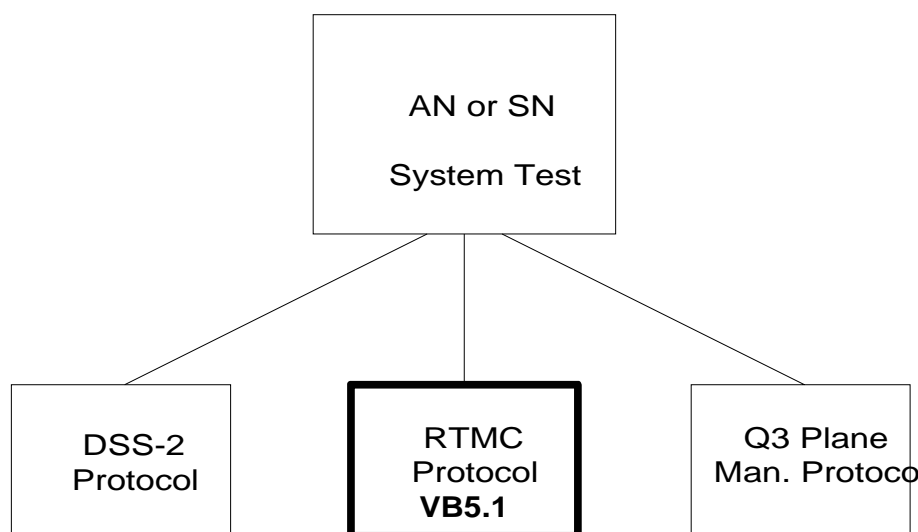
Figure 2: Example of hierarchical test architecture applied beyond VB5.1 testing

NOTE: The example of blocking described above is an illustration of such an approach. It could also be applied in extending the testing of the Q3 management protocol beyond the mere reception of an acknowledgement at the Q3 interface: the full execution a blocking request issued from the Operation System could be checked via DDS-2 to verify that the resource is actually blocked, and via RTMC to verify that real time co-ordination between AN and SN has taken place.

5   ATS conventions

This clause describes the conventions applied to define the ATS and gives the naming conventions chosen for the different elements of the ATS.

The ATS conventions are intended to give a better understanding of the ATS but they describe also the conventions made for the development of the ATS, thus for any later maintenance purposes or further development of the ATS, the conventions described in this clause shall be considered.

5.1   Naming conventions

5.1.1   Declarations part

This subclause describes the naming conventions chosen for the elements of the ATS declarations part.

5.1.1.1   Test suite type and structured type definitions "By Reference"

In order to avoid misalignment problems with the standard, all the types used in this ATS have been defined by reference. The same ASN1 file (RTMCMessages) containing the standard type definitions has been used as module containing the referenced type definitions.

EXAMPLE:

TypeName	*TypeReference*	*ModuleIdentifier*
AwaitClear	AwaitClear	RTMCMessages

5.1.1.2   Test suite constant declarations By Reference

In order to avoid misalignment problems with the standard, all the constants used in this ATS have been defined by reference. The same ASN.1 file RTMCMessages containing the standard constant definitions has been used as module containing the referenced type definitions.