Draft EN 301 005-2 V1.1.1 (1997-11)

European Standard (Telecommunications series)

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

European Telecommunications Standards Institute

Reference
DEN/SPS-03046-2 (9b0i0ico.PDF)

Keywords
V interface, PSTN, ISDN, B-ISDN, AN, SN, PICS

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Foreword

This European Standard (telecommunications series) has been produced by ETSI Technical Committee Signalling Protocols and Switching (SPS), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure (TAP).

The present document is part 2 of a multi-part standard covering the interfaces at the VB5.1 reference point as described below:

Part 1: "Interface specification";

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

NOTE: Further parts covering conformance testing may be identified later.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

Introduction

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented for a telecommunication specification. Such a statement is called a Protocol Implementation Conformance Statement (PICS).

1 Scope

This second part of EN 301 005 provides the Protocol Implementation Conformance Statement (PICS) proforma for the interfaces at the VB5.1 reference point for the support of broadband or combined narrowband and broadband Access Networks (ANs) as defined in EN 301 005-1 [1] in compliance with the relevant requirements, and in accordance with the relevant guidance given in ISO/IEC 9646-7 [4] and ETS 300 406 [2].

It details in tabular form the implementation options, i.e. the optional functions additional to those which are mandatory to implement.

2 Normative references

References may be made to:

a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or

c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d) publications without mention of a specific version, in which case 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] 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] ETS 300 406 (1995): "Methods for Testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

[3] ISO/IEC 9646-1: "Information technology - Open systems interconnection - Conformance testing methodology and framework - Part 1: General concepts".

[4] ISO/IEC 9646-7: "Information technology - Open systems interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

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 [3] and in ISO/IEC 9646-7 [4].

In particular, the following terms defined in ISO/IEC 9646-1 [3] apply:

Protocol Implementation Conformance Statement (PICS): A statement made by the supplier of an implementation or system claimed to conform to a given specification, stating which capabilities have been implemented. The ICS can take several forms: protocol ICS, profile ICS, profile specific ICS, information object ICS, etc.

ICS proforma: A document, in the form of a questionnaire, which when completed for an implementation or system becomes an ICS.

Protocol ICS (PICS): An ICS for an implementation or system claimed to conform to a given protocol specification.

Static conformance review: A review of the extent to which the static conformance requirements are met by the Implementation Under Test (IUT), accomplished by comparing the PICS with the static conformance requirements expressed in the relevant standard(s) (see ISO/IEC 9646-1 [3]).

3.2 Abbreviations

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

AAL	ATM Adaptation Layer
AAL1	ATM Adaptation Layer type 1
AAL5	ATM Adaptation Layer type 5
AIS	Alarm Indication Signal
AN	Access Network
ATM	Asynchronous Transfer Mode
B-AN	Broadband Access Network
B-ISDN	Broadband Integrated Services Digital Network
B-UNI	Broadband User Network Interface
EFCI	Explicit Forward Congestion Indication
GFC	Generic Flow Control
HEC	Header Error Control
ID	Identification
IUT	Implementation Under Test
LSP	Logical Service Port
LUP	Logical User Port
NNI	Network-to-Network Interface
NPC	Network Parameter Control
OAM	Operations Administration and Maintenance
OSI	Open Systems Interconnection
PDH	Plesiochronous Digital Hierarchy
PICS	Protocol Implementation Conformance Statement
ptm	point to multipoint
ptp	point to point
Q3	'Q' Management Interface reference point as ITU-T Recommendation M.3010
RDI	Remote Defect Indication
RTMC	Real Time Management Co-ordination (protocol)
SCS	System Conformance Statement
SDH	Synchronous Digital Hierarchy
SN	Service Node
SSCF	Service Specific Co-ordination Function
SSCOP	Service Specific Connection Oriented Protocol
STM	Synchronous Transport Module
SUT	System Under Test
TB	Broadband T reference point
TC	Termination Convergence
UNI	User Network Interface
UPC	Usage Parameter Control
VC	Virtual Channel
VCCT	Virtual Channel Connection Termination
VCE	Virtual Channel Entity
VCI	Virtual Channel Identifier
VP	Virtual Path
VPCT	Virtual Path Connection Termination
VPE	Virtual Path Entity
VPI	Virtual Path Identifier

4 Conformance to this PICS proforma specification

If it claims to conform to the present document the actual PICS proforma to be filled in by a supplier shall be technically equivalent to the text of the PICS proforma given in annex A, and shall preserve the numbering/naming and ordering of the proforma items.

An PICS which conforms to the present document shall be a conforming PICS proforma completed in accordance with the guidance for completion given in annex A, clause A.1.

Annex A (normative): PICS proforma for EN 301 005-1

A.1 Guidance for completing the PICS proforma

A.1.1 Purposes and structure

The purpose of this PICS proforma is to provide a mechanism whereby a supplier of an implementation of the requirements defined in EN 301 005-1 [1] may provide information about the implementation in a standardized manner.

The PICS proforma is subdivided into subclauses for the following categories of information:

- guidance for completing the PICS proforma;
- identification of the implementation;
- identification of the protocol;
- global statement of conformance;

A.1.2 Abbreviations and conventions

The PICS proforma contained in this annex is comprised of information in tabular form in accordance with the guidelines presented in ISO/IEC 9646-7 [4].

Item column

The item column contains a number which identifies the item in the table.

Item description column

The item description column describes in free text each respective item (e.g. parameters, timers, etc.). It implicitly means "is <item description> supported by the implementation?".

Status column

The following notations, defined in ISO/IEC 9646-7 [4], are used for the status column:

m	mandatory - the capability is required to be supported.
o	optional - the capability may be supported or not.
n/a	not applicable - in the given context, it is impossible to use the capability.
x	prohibited (excluded) - there is a requirement not to use this capability in the given context.
o.i	qualified optional - for mutually exclusive or selectable options from a set. "i" is an integer which identifies an unique group of related optional items and the logic of their selection which is defined immediately following the table.
ci	conditional - the requirement on the capability ("m", "o", "x" or "n/a") depends on the support of other optional or conditional items. "i" is an integer identifying an unique conditional status expression which is defined immediately following the table.

Reference column

The reference column makes reference to EN 301 005-1 [1], except where explicitly stated otherwise.

Support column

The support column shall be filled in by the supplier of the implementation. The following common notations, defined in ISO/IEC 9646-7 [4], are used for the support column:

Y or y	supported by the implementation
N or n	not supported by the implementation
N/A, n/a or -	no answer required (allowed only if the status is n/a, directly or after evaluation of a conditional status)

If this PICS proforma is completed in order to describe a multiple-profile support in a system, it is necessary to be able to answer that a capability is supported for one profile and not supported for another. In that case, the supplier shall enter the unique reference to a conditional expression, preceded by "?" (e.g. ?3). This expression shall be given in the space for comments provided at the bottom of the table. It uses predicates defined in the SCS, each of which refers to a single profile and which takes the value TRUE if and only if that profile is to be used.

EXAMPLE: ?3: IF prof1 THEN Y ELSE N

It is also possible to provide a comment to an answer in the space provided at the bottom of the table.

NOTE: As stated in ISO/IEC 9646-7 [4], support for a received PDU requires the ability to parse all valid parameters of that PDU. Supporting a PDU while having no ability to parse a valid parameter is non-conformant. Support for a parameter on a PDU means that the semantics of that parameter are supported.

References to items

For each possible item answer (answer in the support column) within the PICS proforma a unique reference exists, used, for example, in the conditional expressions. It is defined as the table identifier, followed by a solidus character "/", followed by the item number in the table. If there is more than one support column in a table, the columns are discriminated by letters (a, b, etc.), respectively.

EXAMPLE 1: A.5/4 is the reference to the answer of item 4 in table 5 of annex A.

EXAMPLE 2: A.6/3b is the reference to the second answer (i.e. in the second support column) of item 3 in table 6 of annex A.

Prerequisite line

A prerequisite line takes the form: Prerequisite: <predicate>.

A prerequisite line after a clause or table title indicates that the whole clause or the whole table is not required to be completed if the predicate is FALSE.

A.1.3 Instructions for completing the PICS proforma

The supplier of the implementation shall complete the PICS proforma in each of the spaces provided. In particular, an explicit answer shall be entered, in each of the support or supported column boxes provided, using the notation described in subclause A.1.2.

However, the tables containing in "AN role" subclause shall only be completed for user implementations, and the tables containing in "SN role" subclause shall only be completed for network implementations.

If necessary, the supplier may provide additional comments in space at the bottom of the tables, or separately on sheets of paper.

More detailed instructions are given at the beginning of the different subclauses of the PICS proforma.

A.2 Identification of the implementation

Identification of the Implementation Under Test (IUT) and the system in which it resides (the System Under Test (SUT)) should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the PICS should be named as the contact person.

A.2.1 Date of the statement

.....

A.2.2 Implementation Under Test (IUT) identification

IUT name:

.....

.....

IUT version:

.....

A.2.3 System Under Test (SUT) identification

SUT name:

.....

.....

Hardware configuration:

.....

.....

.....

Operating system:

.....

A.2.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

A.2.5 Client (if different from product supplier)

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

A.2.6 PICS contact person

(A person to contact if there are any queries concerning the content of the PICS)

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

A.3 Identification of the protocol

This PICS proforma applies to the following standard:

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".

A.4 Global statement of conformance

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE: Answering "No" to this question indicates non-conformance to the protocol specification. Non-supported mandatory capabilities are to be identified in the PICS, with an explanation of why the implementation is non-conforming, on pages attached to the PICS proforma.

A.5 Service node

In the tables below only those functions have been specified as "mandatory" which are required to be supported in order to ensure the proper operation of the VB5.1 interface. Functions marked as optional are not required by the VB5.1 interface itself but may be required by an AN or SN specification.

Subclauses shown in the "Reference" column of all following tables refer to EN 301 005-1 [1].

A.5.1 Main features

A.5.1.1 General

Table A.1: Main features

Item	Feature	Reference (subclause)	Status	Support
1	connectivity at VP level in the AN	5.4.3	m	
2	connectivity at VC level in the AN	5.4.3	o	
3	RTMC function	11.1	m	
4	Q3 (SN) interface	10.1	m	

A.5.1.2 Broadband access network connection types across VB5.1 reference point

Table A.2: B-AN connection types

Item	Connection type	Reference (subclause)	Status	Support
1	Type A VP- ptp connections	7.5.1.1	o	
2	Type A VC- ptp connections	7.5.1.1	o	
3	Type A VP- ptm connections	7.5.1.2	o	
4	Type A VC- ptm connections	7.5.1.2	o	
5	Type B VP- ptp connections (note)	7.5.2	m	
6	Type B VC- ptp connections (note)	7.5.2	m	
7	Type D VP- ptp connections	7.6.1	o	
8	Type D VC- ptp connections	7.6.1	o	
9	Type D VP- ptm connections	7.6.2	o	
10	Type D VC- ptm connections	7.6.2	o	
NOTE: Mandatory because of RTMC channel.				

A.5.1.3 Service types

Table A.3: Service types

Item	Type	Reference (subclause)	Status	Support
1	B-ISDN services	7.1	o.301	
2	Non B-ISDN ATM based services	8.2.1	o.301	
3	narrowband services via V5.1	8.3.2.1	o.301	
4	narrowband services via V5.2	8.3.2.1	o.301	
5	narrowband services via V3	8.3.2.1	o.301	
6	other non ATM based services	8.3.2	o.301	

o.301: It is mandatory to support at least one of these items.

A.5.2 VB5.1 reference point

A.5.2.1 Basic characteristics

Table A.4: Basic characteristics of the VB5.1 interface

Item	Characteristic	Reference (subclause)	Status	Support
1	one VB5.1 reference point via one TC function	6.2.2	o	
2	one VB5.1 reference point via multiple TC functions	6.2.2	o	
3	different VB5.1 reference points via common TC function(s)	6.2.2	o	

A.5.2.2 Interface at the VB5.1 reference point

A.5.2.2.1 Support of a physical interface

Table A.5: Physical interface at the VB5.1 reference point

Item	Characteristic	Reference (subclause)	Status	Support
1	physical interface(s) at the VB5.1 reference point	6.2.1	o	
2	a transmission path identification method	6.2.4.5	c.501	

c.501: IF A.5/1 THEN m ELSE n/a.

A.5.2.2.2 Physical layer options

Table A.6: Physical layer options

Item	Physical layer options	Reference	Status	Support
1	PDH/Electrical (G.703)/E3	Annex G	c.601	
2	SDH/Electrical (G.703)/STM1	Annex G	c.601	
3	SDH/Optical (G.957 intra-office)/STM1	Annex G	c.601	
4	SDH/Optical (G.957 intra-office)/STM4	Annex G	c.601	
5	SDH/Optical (G.957 short haul)/STM1	Annex G	c.601	
6	SDH/Optical (G.957 short haul)/STM4	Annex G	c.601	
7	other (note)		c.601	
NOTE: Other physical layer options can be added if required.				

c.601: IF A.5/1 THEN it is mandatory to support at least one of these items.

A.5.2.3 ATM layer at the VB5.1 reference point

Table A.7: ATM layer at the VB5.1 reference point

Item	ATM layer characteristics	Reference (subclause)	Status	Support
1	cell header format according to NNI specification	6.3.1	m	
2	provision of VPI and VCI values for the RTMC channel	6.3.1	m	

A.5.2.4 ATM adaptation layer

A.5.2.4.1 AAL for the RTMC protocol

Table A.8: AAL functions for the RTMC protocol

Item	Are the AAL functions for the RTMC protocol compliant with	Reference (subclause)	Status	Support
1	AAL5 specification	6.4.5.2	m	
2	SSCOP specification	6.4.5.3	m	
3	SSCF specification	6.4.5.4	m	

A.5.2.4.2 AAL for circuit emulation of 2 048 kbit/s signals

Table A.9: AAL functions for circuit emulation of 2 048 kbit/s signals

Item	AAL type	Reference (subclause)	Status	Support
1	AAL1 for circuit emulation of 2 048 kbit/s signals	8.3.2.2	c.901	

c.901: IF A3/3 OR A3/4 OR A3/5 THEN m ELSE o.

A.5.3 Transfer and layer management functions

A.5.3.1 Functions associated with the physical service port

Table A.10: VP multiplexing entity (direction from VB5)

Item	Function	Reference (subclause)	Status	Support
1	HEC processing	9.8	m	
2	Cell header verification	9.8	m	
3	VPI verification	9.8	m	
4	VP demultiplexing	9.8	m	

Table A.11: VP multiplexing entity (direction to VB5)

Item	Function	Reference (subclause)	Status	Support
1	VP multiplexing	9.8	m	
2	HEC processing	9.8	m	

A.5.3.2 Functions associated with the logical service port

A.5.3.2.1 VP sublayer functions associated with LSP

Table A.12: VP entity (direction from VB5)

Item	Function	Reference (subclause)	Status	Support
1	F4 OAM cell insertion / extraction and processing (note)	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.1-1.				

Table A.13: VP entity (direction to VB5)

Item	Function	Reference (subclause)	Status	Support
1	F4 OAM cell insertion/ extraction and processing (note)	9.9.2	m	
2	VPI setting	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.1-1.				

A.5.3.2.2 VC sublayer functions on top of the LSP

Table A.14: VP connection termination (direction from VB5)

Item	Function	Reference (subclause)	Status	Support
1	End-to-end F4 OAM cell extraction and processing (note)	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.1-1.				

Table A.15: VP connection termination (direction to VB5)

Item	Function	Reference (subclause)	Status	Support
1	End-to-end F4 OAM cell insertion (note)	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.1-1.				

Table A.16: VC multiplexing entity (direction from VB5)

Item	Function	Reference (subclause)	Status	Support
1	VCI verification and invalid VCI cell discard	9.9.2	m	
2	VC demultiplexing	9.9.2	m	

Table A.17: VC multiplexing entity (direction to VB5)

Item	Function	Reference (subclause)	Status	Support
1	VC multiplexing	9.9.2	m	

Table A.18: VC entity (direction from VB5)

Item	Function	Reference (subclause)	Status	Support
1	F5 OAM cell insertion/extraction and processing (note)	9.9.2	m	
2	VC UPC	9.9.2	c.1801	
NOTE: The status for the individual sub-functions is specified in annex B, table B.1-2.				

c.1801: IF A.24/1 OR A.24/3 OR A.24/7 OR A.24/9 THEN m ELSE n/a.

Table A.19: VC entity (direction to VB5)

Item	Function	Reference (subclause)	Status	Support
1	F5 OAM cell insertion/extraction and processing (note)	9.9.2	m	
2	VCI setting	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.1-2.				

Table A.20: VC connection termination (direction from VB5)

Item	Function	Reference (subclause)	Status	Support
1	End-to-end F5 OAM cell extraction and processing (note)	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.1-2.				

Table A.21: VC connection termination (direction to VB5)

Item	Function	Reference (subclause)	Status	Support
1	End-to-end F5 OAM cell insertion (note)	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.1-2.				

A.5.4 RTMC function and protocol

Table A.22: RTMC function and protocol

Item	Characteristic	Reference (clause)	Status	Support
1	RTMC function and protocol	13	m	

A.6 Access network

In the tables below only those functions have been specified as "mandatory" which are required to be supported in order to ensure the proper operation of the VB5.1 interface. Functions marked as optional are not required by the VB5.1 interface itself but may be required by an AN or SN specification.

Subclauses shown in the "Reference" column of all following tables refer to EN 301 005-1 [1].

A.6.1 Main features

A.6.1.1 General

Table A.23: Main features

Item	Feature	Reference (subclause)	Status	Support
1	B-ISDN-Access types	7.1	o	
2	Narrowband access	7.6.3	o	
3	Non B-ISDN access, ATM-based	8.2	o	
4	Non B-ISDN access, non ATM-based	8.2	o	
5	connectivity at VP level in the AN	5.4.3	m	
6	connectivity at VC level in the AN	5.4.3	o	
7	RTMC function	11	m	
8	Q3 (AN) interface	10.1	m	
9	multiple VB5.1 reference points	10.2	o	

A.6.1.2 Broadband access network connection types across VB5.1 reference point

Table A.24: B-AN connection types

Item	Connection type	Reference (subclause)	Status	Support
1	Type A VP- ptp connections	7.5.1.1	o	
2	Type A VC- ptp connections	7.5.1.1	o	
3	Type A VP- ptm connections	7.5.1.2	o	
4	Type A VC- ptm connections	7.5.1.2	o	
5	Type B VP- ptp connections (note)	7.5.2	m	
6	Type B VC- ptp connections (note)	7.5.2	m	
7	Type D VP- ptp connections	7.6.1	o	
8	Type D VC- ptp connections	7.6.1	o	
9	Type D VP- ptm connections	7.6.2	o	
10	Type D VC- ptm connections	7.6.2	o	
NOTE: Mandatory because of RTMC.				

A.6.1.3 Support of non B-ISDN access types

A.6.1.3.1 Narrowband access types

Table A.25: Narrowband access types

Item	Narrowband access type	Reference (subclause)	Status	Support
1	via V5.1 interface	8.3.2.1	c.2501	
2	via V5.2 interface	8.3.2.1	c.2501	
3	via V3 interface	8.3.2.1	c.2501	

c.2501: IF A.23/2 THEN it is mandatory to support at least one of these items.

A.6.2 VB5.1 reference point

A.6.2.1 Basic characteristics

Table A.26: Basic characteristics of the VB5.1 interface

Item	Characteristic	Reference (subclause)	Status	Support
1	one VB5.1 reference point via one TC function	6.2.2	o	
2	one VB5.1 reference point via multiple TC functions	6.2.2	o	
3	different VB5.1 reference points via common TC function(s)	6.2.2	o	

A.6.2.2 Interface at the VB5.1 reference point

A.6.2.2.1 Support of a physical interface

Table A.27: Physical interface at the VB5.1 reference point

Item	Characteristic	Reference (subclause)	Status	Support
1	physical interface(s) at the VB5.1 reference point	6.2.1	o	
2	a transmission path identification method	6.2.4.5	c.2701	

c.2701: IF A.27/1 THEN m ELSE n/a.

A.6.2.2.2 Physical layer options

Table A.28: Physical layer options

Item	Physical layer options	Reference	Status	Support
1	PDH/Electrical (G.703)/E3	Annex G	c.2801	
2	SDH/Electrical (G.703)/STM1	Annex G	c.2801	
3	SDH/Optical (G.957 intra-office)/STM1	Annex G	c.2801	
4	SDH/Optical (G.957 intra-office)/STM4	Annex G	c.2801	
5	SDH/Optical (G.957 short haul)/STM1	Annex G	c.2801	
6	SDH/Optical (G.957 short haul)/STM4	Annex G	c.2801	
7	other		c.2801	

c.2801: IF A.27/1 THEN it is mandatory to support at least one of these items.

A.6.2.3 ATM layer at the VB5.1 reference point

Table A.29: ATM layer at the VB5.1 reference point

Item	ATM layer characteristics	Reference (subclause)	Status	Support
1	cell header format according to NNI specification	6.3.1	m	
2	provision of VPI and VCI values for the RTMC channel	6.3.1	m	

A.6.2.4 ATM adaptation layer

A.6.2.4.1 AAL for the RTMC protocol

Table A.30: AAL functions for the RTMC protocol

Item	Are the AAL functions for the RTMC protocol compliant with	Reference (subclause)	Status	Support
1	AAL5 specification	6.4.5.2	m	
2	SSCOP specification	6.4.5.3	m	
3	SSCF specification	6.4.5.4	m	

A.6.2.4.2 AAL for circuit emulation of 2 048 kbit/s signals

Table A.31: AAL functions for circuit emulation of 2 048 kbit/s signals

Item	AAL type	Reference (subclause)	Status	Support
1	AAL1 for circuit emulation of 2 048 kbit/s signals	8.3.2.2	c.3101	

c.3101: IF A.25/1 OR A.25/2 /OR A.25/3 THEN m ELSE o.

A.6.3 UNI

A.6.3.1 Basic characteristics

Table A.32: Basic characteristics of the UNI

Item	Characteristic	Reference (subclause)	Status	Support
1	UNIs based on a single TC function	6.2.1	c.3201	
2	UNIs based on multiple TC functions	6.2.1	c.3202	
3	shared UNIs	6.2.1	c.3203	

c.3201 IF A.23/1 THEN m ELSE n/a.
c.3202 IF A.23/1 THEN o ELSE n/a.
c.3203: IF A.23/9 THEN o ELSE n/a.

A.6.3.2 Physical layer

Table A.33: Physical layer of B-UNIs

Item	Physical layer	Reference (subclause)	Status	Support
1	E1 (2,048 Mbit/s)	9.4	c.3301	
2	STM-1 (155,52 Mbit/s)	9.4	c.3301	
3	STM-4 (622,08 Mbit/s)	9.4	c.3301	
4	cell based (155,52 Mbit/s)	9.4	c.3301	
5	cell based (622,08 Mbit/s)	9.4	c.3301	
6	other (note)		c.3301	
NOTE: Other physical layer options can be added if required.				

c.3301: IF A.23/1 THEN it is mandatory to support at least one of these items.

A.6.4 Transfer and layer management functions

A.6.4.1 Functions associated with the physical user port

Table A.34: VP multiplexing entity (direction from TB)

Item	Function	Reference (subclause)	Status	Support
1	Mapping	9.4	c.3401	
2	Cell delineation	9.4	c.3401	
3	Scrambling	9.4	c.3401	
4	HEC processing	9.4	c.3401	
5	Cell rate decoupling	9.4	c.3401	
6	Cell header verification	9.4	c.3401	
7	Generic flow control (GFC) (note)	9.4	c.3401	
8	VPI verification	9.4	c.3401	
9	VP demultiplexing	9.4	c.3401	
NOTE: According to EN 301 005-1 only the "uncontrolled transmission" set of procedures shall be supported where the GFC is ignored.				

c.3401: IF A.23/1 THEN m ELSE n/a.

Table A.35: VP multiplexing entity (direction to TB)

Item	Function	Reference (subclause)	Status	Support
1	VP multiplexing	9.4	c.3501	
2	Generic flow control (GFC) (note)	9.4	c.3501	
3	Cell rate decoupling	9.4	c.3501	
4	HEC processing	9.4	c.3501	
5	Scrambling	9.4	c.3501	
6	Cell stream mapping	9.4	c.3501	
NOTE: According to EN 301 005-1 only the "uncontrolled transmission" set of procedures shall be supported where the GFC is ignored.				

c.3501: IF A.23/1 THEN m ELSE n/a.

A.6.4.2 Functions associated with the logical user port

A.6.4.2.1 VP sublayer functions associated with the LUP

Table A.36: VP entity (direction from TB)

Item	Function	Reference (subclause)	Status	Support
1	VP UPC	9.5.2	c.3601	
2	F4 OAM cell insertion/extraction and processing (note)	9.5.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.2-1.				

c.3601: IF A.24/1 OR A.24/3 OR A.24/7 OR A.24/9 THEN m ELSE n/a.

Table A.37: VP entity (direction to TB)

Item	Function	Reference (subclause)	Status	Support
1	**F4 OAM cell insertion/extraction and processing (note)**	**9.5.2**	m	
2	VPI setting	9.5.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.2-1.				

A.6.4.2.2 VC sublayer functions on top of the LUP

Table A.38: VP connection termination (direction from TB)

Item	Function	Reference (subclause)	Status	Support
1	End-to-end F4 OAM cell extraction and processing (note)	9.5.2	c.3801	
NOTE: The status for the individual sub-functions is specified in annex B, table B.2-1.				

c.3801: IF A.24/2 OR A.24/4 OR A.24/8 OR A.24/10 THEN m ELSE n/a.

Table A.39: VP connection termination (direction to TB)

Item	Function	Reference (subclause)	Status	Support
1	End-to-end F4 OAM cell insertion (note)	9.5.2	c.3901	
NOTE: The status for the individual sub-functions is specified in annex B, table B.2-1.				

c.3901: IF A.24/2 OR A.24/4 OR A.24/8 OR A.24/10 THEN m ELSE n/a.

Table A.40: VC multiplexing entity (direction from TB)

Item	Function	Reference (subclause)	Status	Support
1	VCI verification and invalid VCI cell discard	9.5.2	c.4001	
2	VC demultiplexing	9.5.2	c.4001	

c.4001: IF A.24/2 OR A.24/4 OR A.24/8 OR A.24/10 THEN m ELSE n/a.

Table A.41: VC multiplex entity (direction to TB)

Item	Function	Reference (subclause)	Status	Support
1	VC multiplexing	9.5.2	c.4101	

c.4101: IF A.24/2 OR A.24/4 OR A.24/8 OR A.24/10 THEN m ELSE n/a.

Table A.42: VC entity (direction from TB)

Item	Function	Reference (subclause)	Status	Support
1	F5 OAM cell insertion/extraction and processing (note)	9.5.2	c.4201	
2	VC UPC	9.5.2	c.4201	
NOTE: The status for the individual sub-functions is specified in annex B, table B.2-2.				

c.4201: IF A.24/2 OR A.24/4 OR A.24/8 OR A.24/10 THEN m ELSE n/a.

Table A.43: VC entity (direction to TB)

Item	Function	Reference (subclause)	Status	Support
1	F5 OAM cell insertion/extraction and processing (note)	9.5.2	c.4301	
2	VCI setting	9.5.2	c.4301	
NOTE: The status for the individual sub-functions is specified in annex B, table B.2-2.				

c.4301: IF A.24/2 OR A.24/4 OR A.24/8 OR A.24/10 THEN m ELSE n/a.

A.6.4.3 Connection functions

Table A.44: VP connection entity

Item	Function	Reference (subclause)	Status	Support
1	VP link-Interconnection	9.7	c.4401	

c.4401: IF A.24/1 OR A.24/3 OR A.24/7 OR A.24/9 THEN m ELSE n/a.

Table A.45: VC connection entity

Item	Function	Reference (subclause)	Status	Support
1	VC link-Interconnection	9.7	c.4501	

c.4501: IF A.24/2 OR A.24/4 OR A.24/8 OR A.24/10 THEN m ELSE n/a.

A.6.4.4 Functions associated with the physical service port

Table A.46: VP multiplexing entity (direction from VB5)

Item	Function	Reference (subclause)	Status	Support
1	HEC processing	9.8	m	
2	Cell header verification	9.8	m	
3	VPI verification	9.8	m	
4	VP demultiplexing	9.8	m	

Table A.47: VP multiplexing entity (direction to VB5)

Item	Function	Reference (subclause)	Status	Support
1	VP multiplexing	9.8	m	
2	HEC processing	9.8	m	

A.6.4.5 Functions associated with the logical service port

A.6.4.5.1 VP sublayer functions associated with LSP

Table A.48: VP entity (direction from VB5)

Item	Function	Reference (subclause)	Status	Support
3	F4 OAM cell insertion/ extraction and processing (note)	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.3-1.				

Table A.49: VP entity (direction to VB5)

Item	Function	Reference (subclause)	Status	Support
1	F4 OAM cell insertion/ extraction and processing (note)	9.9.2	m	
2	VPI setting	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.3-1.				

A.6.4.5.2 VC sublayer functions on top of LSP

Table A.50: VP connection termination (direction from VB5)

Item	Function	Reference (subclause)	Status	Support
1	End-to-end F4 OAM cell extraction and processing (note)	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.3-2.				

Table A.51: VP connection termination (direction to VB5)

Item	Function	Reference (subclause)	Status	Support
1	End-to-end F4 OAM cell insertion (note)	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.3-2.				

Table A.52: VC multiplexing entity (direction from VB5)

Item	Function	Reference (subclause)	Status	Support
1	VCI verification and invalid VCI cell discard	9.9.2	m	
2	VC demultiplexing	9.9.2	m	

Table A.53: VC multiplex entity (direction to VB5)

Item	Function	Reference (subclause)	Status	Support
1	VC multiplexing	9.9.2	m	

Table A.54: VC entity (direction from VB5)

Item	Function	Reference (subclause)	Status	Support
1	F5 OAM cell insertion/extraction and processing (note)	9.9.2	m	
2	VC NPC	9.9.2	o	
NOTE: The status for the individual sub-functions is specified in annex B, table B.3-2.				

Table A.55: VC entity (direction to VB5)

Item	Function	Reference (subclause)	Status	Support
1	F5 OAM cell insertion/extraction and processing (note)	9.9.2	m	
2	VCI setting	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.3-2.				

Table A.56: VC connection termination (direction from VB5)

Item	Function	Reference (subclause)	Status	Support
1	End-to-end F5 OAM cell extraction and processing (note)	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.3-2.				

Table A.57: VC connection termination (direction to VB5)

Item	Function	Reference (subclause)	Status	Support
1	End-to-end F5 OAM cell insertion (note)	9.9.2	m	
NOTE: The status for the individual sub-functions is specified in annex B, table B.3-2.				

A.6.5 RTMC function and protocol

Table A.58: RTMC function

Item	Function	Reference (clause)	Status	Support
1	RTMC function and protocol	13	m	

Annex B (informative): Status of OAM functions based F4/F5 flows

This annex provides information about the status of the individual sub-functions related to the application of OAM F4 and F5 flows.

The status of most of the F4/F5 OAM functions have been specified as "mandatory" within the relevant tables of the present document. However some of the individual sub-functions are considered as optional according to EN 301 005-1 in conjunction with the ITU-T Recommendations I.610 and I.732. In the tables below only those sub-functions have been specified as "mandatory" which are required to be supported in order to ensure the proper operation of the VB5.1 interface. Functions marked as optional are not required by the VB5.1 interface itself but may be required by an AN or SN specification.

B.1 OAM functions at service port (SN-side)

Table B.1-1: F4 OAM functions at service port (SN-side)

Item	Function (note)	Status			
		VPE (from VB5)	VPE (to VB5)	VPCT (from VB5)	VPCT (to VB5)
		Table A.12	Table A.13	Table A.14	Table A.15
1	VP AIS	m	m	n/a	n/a
2	VP RDI	n/a	n/a	n/a	m
3	VP AIS/RDI	n/a	n/a	m	n/a
4	end-to-end continuity check	n/a	n/a	o	o
5	segment continuity check	o	o	n/a	n/a
6	end-to-end performance monitoring	n/a	n/a	o	o
7	segment performance monitoring	o	o	n/a	n/a
8	loopback end-to-end source point	o	o	m	m
9	loopback end-to-end loopback point	n/a	n/a	o	o
10	loopback segment source point	o	o	n/a	n/a
11	loopback segment loopback point	o	o	n/a	n/a
12	end-to-end activation/deactivation	n/a	n/a	o	o
13	segment activation/deactivation	o	o	n/a	n/a
NOTE: Detailed description of the individual function listed in items 1 to 13 of this table is provided in ITU-T-Recommendation I.732 clause 5.					

Table B.1-2: F5 OAM functions at service port (SN-side)

Item	Function (note)	Status			
		VCE (from VB5)	VCE (to VB5)	VCCT (from VB5)	VCCT (to VB5)
		Table A.18	Table A.19	Table A.20	Table A.21
1	VC AIS	m	m	n/a	n/a
2	VC RDI	n/a	n/a	n/a	m
3	VC AIS/RDI	n/a	n/a	m	n/a
4	end-to-end continuity check	n/a	n/a	o	o
5	segment continuity check	o	o	n/a	n/a
6	end-to-end performance monitoring	n/a	n/a	o	o
7	segment performance monitoring	o	o	n/a	n/a
8	loopback end-to-end source point	o	o	o	o
9	loopback end-to-end loopback point	n/a	n/a	o	o
10	loopback segment source point	o	o	n/a	n/a
11	loopback segment loopback point	o	o	n/a	n/a
12	end-to-end activation/deactivation	n/a	n/a	o	o
13	segment activation/deactivation	o	o	n/a	n/a
NOTE: Detailed description of the individual function listed in items 1 to 13 of this table is provided in ITU-T-Recommendation I.732 clause 5.					

B.2 OAM functions at user port

Table B.2-1: F4 OAM functions at user port

Item	Function (note)	Status			
		VPE (from TB)	VPE (to TB)	VPCT (from TB)	VPCT (to TB)
		Table A.36	Table A.37	Table A.38	Table A.39
1	VP AIS	m	m	n/a	n/a
2	VP RDI	n/a	n/a	n/a	m
3	VP AIS/RDI	n/a	n/a	m	n/a
4	end-to-end continuity check	n/a	n/a	o	o
5	segment continuity check	o	o	n/a	n/a
6	end-to-end performance monitoring	n/a	n/a	o	o
7	segment performance monitoring	o	o	n/a	n/a
8	loopback end-to-end source point	o	o	o	o
9	loopback end-to-end loopback point	n/a	n/a	o	o
10	loopback segment source point	o	o	n/a	n/a
11	loopback segment loopback point	o	o	n/a	n/a
12	end-to-end activation/deactivation	n/a	n/a	o	o
13	segment activation/deactivation	o	o	n/a	n/a
NOTE: Detailed description of the individual function listed in items 1 to 13 of this table is provided in ITU-T- Recommendation I.732 clause 5.					

Table B.2-2: F5 OAM functions at user port

Item	Function (note)	Status	
		VCE (from TB)	VCE (to TB)
		Table A.42	Table A.43
1	VC AIS	m	m
2	VC RDI	n/a	n/a
3	VC AIS/RDI	n/a	n/a
4	end-to-end continuity check	n/a	n/a
5	segment continuity check	o	o
6	end-to-end performance monitoring	n/a	n/a
7	segment performance monitoring	o	o
8	loopback end-to-end source point	o	o
9	loopback end-to-end loopback point	n/a	n/a
10	loopback segment source point	o	o
11	loopback segment loopback point	o	o
12	end-to-end activation/deactivation	n/a	n/a
13	segment activation/deactivation	o	o
NOTE: Detailed description of the individual function listed in items 1 to 13 of this table is provided in ITU-T- Recommendation I.732 clause 5.			

B.3 OAM functions at service port (AN-side)

Table B.3-1: F4 OAM functions at service port (AN-side)

Item	Function (note)	Status			
		VPE (from VB5)	VPE (to VB5)	VPCT (from VB5)	VPCT (to VB5)
		Table A.48	Table A.49	Table A.50	Table A.51
1	VP AIS	m	m	n/a	n/a
2	VP RDI	n/a	n/a	n/a	m
3	VP AIS/RDI	n/a	n/a	m	n/a
4	end-to-end continuity check	n/a	n/a	o	o
5	segment continuity check	o	o	n/a	n/a
6	end-to-end performance monitoring	n/a	n/a	o	o
7	segment performance monitoring	o	o	n/a	n/a
8	loopback end-to-end source point	o	o	o	o
9	loopback end-to-end loopback point	n/a	n/a	m	m
10	loopback segment source point	o	o	n/a	n/a
11	loopback segment loopback point	o	o	n/a	n/a
12	end-to-end activation/deactivation	n/a	n/a	o	o
13	segment activation/deactivation	o	o	n/a	n/a
NOTE: Detailed description of the individual function listed in items 1 to 13 of this table is provided in ITU-T-Recommendation I.732 clause 5.					

Table B.3-2: F5 OAM functions at service port (AN-side)

Item	Function (note)	Status			
		VCE (from VB5)	VCE (to VB5)	VCCT (from VB5)	VCCT (to VB5)
		Table A.54	Table A.55	Table A.56	Table A.57
1	VC AIS	m	m	n/a	n/a
2	VC RDI	n/a	n/a	n/a	m
3	VC AIS/RDI	n/a	n/a	m	n/a
4	end-to-end continuity check	n/a	n/a	o	o
5	segment continuity check	o	o	n/a	n/a
6	end-to-end performance monitoring	n/a	n/a	o	o
7	segment performance monitoring	o	o	n/a	n/a
8	loopback end-to-end source point	o	o	o	o
9	loopback end-to-end loopback point	n/a	n/a	o	o
10	loopback segment source point	o	o	n/a	n/a
11	loopback segment loopback point	o	o	n/a	n/a
12	end-to-end activation/deactivation	n/a	n/a	o	o
13	segment activation/deactivation	o	o	n/a	n/a
NOTE: Detailed description of the individual function listed in items 1 to 13 of this table is provided in ITU-T-Recommendation I.732 clause 5.					

History

Document history				
V1.1.1	November 1997	Public Enquiry	PE 9813:	1997-11-28 to 1998-03-27