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Technical Specification

Broadband Radio Access Networks (BRAN);
HiperMAN;
Conformance Testing for WiMAX/HiperMAN 1.2.1;
Part 1: Protocol Implementation Conformance Statement (PICS) proforma

Reference

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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 Technical Specification (TS) has been produced by ETSI Technical Committee Broadband Radio Access Networks (BRAN).

The present document specifies the Protocol Implementation Conformance Statement (PICS) for HIgh PERformance Radio Metropolitan Area Network (HiperMAN) and WiMAX, which operates on frequencies between 2 GHz and 11 GHz.

The present document has been developed on the basis of preceding versions of HiperMAN and WiMAX PICS and makes the previous versions obsolete.

The present document is part 1 of a multi-part deliverable covering Broadband Radio Access Networks (BRAN); HiperMAN; Conformance Testing for WiMAX/HiperMAN 1.2.1, as identified below:

Part 1: "Protocol Implementation Conformance Statement (PICS) proforma";

Part 2: "Test Suite Structure and Test Purposes (TSS&TP)";

Part 3: "Abstract Test Suite (ATS)".

1 Scope

The present document specifies the Protocol Implementation Conformance Statement (PICS) for HiperMAN/WiMAX per ISO/IEC 9646-7 [7] and EG 201 058 [9] for conformance of HiperMAN/WiMAX compliant systems.

Although this PICS refers to IEEE 802.16e [5], its scope is currently limited to IEEE 802.16 [4] with Corrigendum 1. The items covered by this PICS are also currently restricted to the OFDM + PMP configuration.

2 References

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.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
  - for informative references.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] ETSI TS 102 177: "Broadband Radio Access Networks (BRAN); HiperMAN; Physical (PHY) layer".

[2] ETSI TS 102 178 (V1.2.1): "Broadband Radio Access Networks (BRAN); HiperMAN; Data Link Control (DLC) layer".

[3] ETSI TS 102 210: "Broadband Radio Access Networks (BRAN); HiperMAN; System profiles".

[4] IEEE 802.16-2004: "IEEE Standard for local and metropolitan area networks - Part 16: Air Interface for Fixed Broadband Wireless Access Systems".

[5] IEEE 802.16e-2005: "Standard for Local and metropolitan area networks - Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems. Amendment 2: Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands and Corrigendum 1".

[6] ISO/IEC 9646-1/ITU-T Recommendation X.290: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".

[7] ISO/IEC 9646-7/ITU-T Recommendation X.296: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

[8] Void.

[9] ETSI EG 201 058: "Methods for Testing and Specification (MTS); Implementation Conformance Statement (ICS) proforma style guide".

[10] IEEE 802.3: "IEEE Standard for Information Technology - Telecommunications and Information Exchange between Systems - Local and Metropolitan Area Networks - Specific requirements - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications".

[11] IEEE 802.1Q: "IEEE Standards for Local and Metropolitan Area Networks - Virtual Bridged Local Area Networks".

[12] ITU-T Recommendation X.690: "Information technology - ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)".

[13] IETF RFC 2131: "Dynamic Host Configuration Protocol".

[14] IETF RFC 868: "Time Protocol".

[15] IEEE 802.2/ISO/IEC 8802.2 (1998): "IEEE Standard for Information technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part 2: Logical Link Control".

[16] IEEE 802.1D - 2004: "IEEE standard for Local and metropolitan area networks--Media Access Control (MAC) Bridges".

NOTE: Incorporates IEEE 802.1t-2001 and IEEE 802.1w.

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Not applicable.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ISO/IEC 9646-1 [6], TS 102 177 [1], TS 102 178 [2], ISO/IEC 9646-1 [6] and IEEE 802.16-2004 [4] as corrected by Corrigendum 1 of IEEE 802.16e-2005 [5] apply.

3.2 Symbols

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

BW	Nominal channel bandwidth (MHz)
m	CID range divider
$P_{TX,max}$	Maximum mean transmit power at the antenna port (dBm)
T_b	Useful OFDM symbol time (s)

T_F	Frame duration (ms)
T_g	OFDM symbol guard time or CP time (s)
T_s	OFDM symbol time (s)

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TS 102 177 [1], TS 102 178 [2], ISO/IEC 9646-1 [6] and the following apply:

AAS	Adaptive Antenna System
ARQ	Automatic Repeat reQuest
BE	Best Effort service
BER	Bit Error Rate
BPSK	Binary Phase Shift Keying
BS	Base Station
BSN	Block Sequence Number
BW	BandWidth
CBC	Cipher Block Chaining
CC	Convolutional Coding
CID	Connection IDentifier
CINR	Carrier to noise and INterference Ratio
CRC	Cyclic Redundancy Check
DCD	Downlink Channel Descriptor
DES	Data Encryption Standard
DFS	Dynamic Frequency Selection
DHCP	Dynamic Host Configuration Protocol
DIUC	Dowlink Interval Usage Code
DL	DownLink
DLFP	DownLink Frame Prefix
DSA	Dynamic Service Addition
DSC	Dynamic Service Change
DSD	Dynamic Service Deletion
EIRP	Effective Isotropic Radiated Power
FC	Fragmentation Control
FEC	Forward Error Correction
FPC	Fast Power Control
FSN	Frequence Sequence Number
HCS	Header Check Sequence
HM	HiperMAN
HMAC	Hashed Message Authentication Code
ID	IDentifier
IE	Information Element
IUT	Implementation Under Test
MAC	Medium Access Control
MSB	Most Significant Bit
OFDM	Orthogonal Frequency Division Multiplexing
PDU	Protocol Data Unit
PHY	PHYsical layer
PICS	Protocol Implementation Conformance Statement
PKM	Privacy Key Management
PMP	Point-to-Multipoint
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
REQ	REQuest
RNG	RaNGing
RS	Reed Solomon
RSP	ReSPonse
RSSI	Received Signal Strength Indicator
RTG	Receive/Transmit transition Gap
rtPS	real time Polling Service

SA	Security Association
SAID	Security Association IDentifier
SAP	Service Access Point
SI	Slip Indicator
SNMP	Simple Network Management Protocol
SS	Subscriber Station
STC	Space Time Coding
SUT	System Under Test
TC	Transmission Convergence sublayer
TFTP	Trivial File Transfer Protocol
TLV	Type/Length/Value
TTG	Transmit/receive Transition Gap
TX	Transmitter
UCD	Uplink Channel Descriptor
UGS	Unsolicited Grant Service
UL	UpLink
VLAN	Virtual Local Area Network

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.

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

Annex A (normative): Protocol ICS (PICS) for HiperMAN/WiMAX

A.1 Guidance for completing 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 TS 102 177 [1] and TS 102 178 [2] (which mandates requirements defined in IEEE 802.16-2004 [4]) may provide information about the implementation in a standardized manner. The PICS proforma does not cover every possible compliant HiperMAN/WiMAX implementation, but only those implementations that are compliant with the system profiles as defined in TS 102 210 [3].

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

- guidance for completing the PICS proforma;
- identification and implementation;
- identification of the standard;
- global statement of conformance;
- roles;
- Subscriber Station (SS);
- Base Station (BS).

A.1.2 Abbreviations and Conventions

Item column

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

Capability column

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

Reference column

- The reference column indicates the section of TS 102 177 [1], TS 102 178 [2], IEEE 802.16-2004 [4] from which the requirement for the capability is derived. A reference to [4] is to be understood as a reference to IEEE 802.16-2004 [4] as corrected by Corrigendum 1 of IEEE 802.16e-2005 [5].

Status column

- The following notations, defined in [6], are used in 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 option - for mutually exclusive or selectable options from a set. "i" is an integer which identifies a 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 a conditional status expression which is defined immediately following the table.
i	Irrelevant (out of scope) - capability outside the scope of the reference specification. No answer is requested from the supplier.

Support column

- The support column shall be filled in by the supplier of the implementation. The following common notations, defined in [6] are used for the support column.

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

If this PICS proforma is completed in order to describe a multiple-profile implementation, it may be necessary to answer that a capability is supported for one profile and not supported for another. In that case, the supplier shall enter a unique reference to a conditional expression, preceded by "?" (e.g. ?3). This expression shall be given in the space provided for comments at the bottom of the table. It uses the predicates defined in [6], each of which refers to a single profile or a family of profiles and which takes the value TRUE if and only if that profile is to be used.

EXAMPLE: ?3: If profM1 then Y else N.

NOTE: As stated in [6], 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.

Values allowed column

- The values allowed column is only used when necessary in a table. It contains the type, the list, the range, or the length of values allowed. The following notations are used.

Range of values: Example:	<min value>...<max value> 5...20
List of values: Example 1: Example 2: Example 3:	<value1>, <value2>, …, <valueN> 2, 4, 6, 8, 9 1101b, 1011b, 1111b 0x0A, 0x34, 0x2F
List of named values: Example:	<name1>(<val1>), <name2>(<val2>), …, <nameN>(<valN>) reject(1), accept(2)
Length: Example:	Size (<min size>...<max size>) Size (1...8)

Values supported column

- The values supported column is only present when the values allowed column is present. It shall be filled in by the supplier of the implementation. In this column, the value or the ranges of values supported by the implementation shall be indicated.

Reference to items

- For each possible item answer in the support column within the PICS proforma a unique reference exists which may be used, for example, in conditional expressions. It is defined as the table identifier, followed by the "/" 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.).

Example 1:	Table A.5/4 is the reference to the answer of item 4 in table A.5.
Example 2:	Table A.6/3b is the reference to the second answer (i.e. in the second support column) of item 3 in table A.6.

Prerequisite Line

- A prerequisite line takes the form: Prerequisite: <predicate>.
- A prerequisite line after a clause or table title indicates that the entire clause or the entire 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 the support or values supported column boxes provided, using the notation described in clause A.1.2.

However, tables related to Subscriber Station (SS) shall only be completed for Subscriber Station implementations, and tables related to Base Station (BS) shall only be filled in for Base Station implementations.

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

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 details as possible regarding version numbers and configuration options.

The product supplier 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 statement

Date of statement (MM/DD/YYYY):	

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 Nr.:	
Fax Nr:	
E-mail address:	
Additional information:	

A.2.5 Client (if different from product supplier)

Name:	
Address:	
Telephone Nr.:	
Fax Nr:	
E-mail address:	
Additional information:	

A.2.6 PICS contact person

(A person to contact if there is any query concerning the content of the PICS.)

Name:	
Address:	
Telephone Nr.:	
Fax Nr:	
E-mail address:	
Additional information:	