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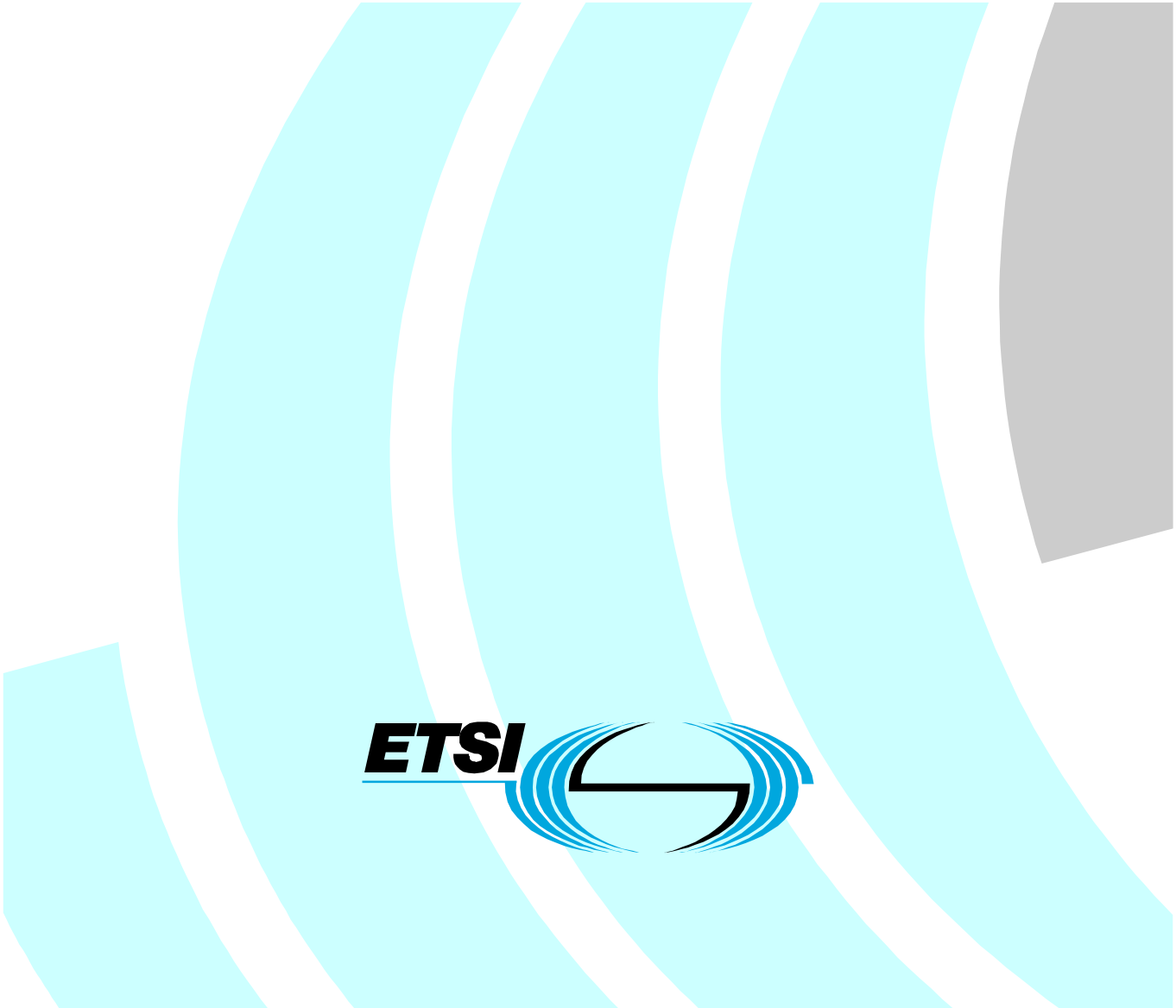
Technical Specification

Broadband Radio Access Networks (BRAN);
HIPERLAN Type 2;
Conformance testing for the
Data Link Control (DLC) layer;
Part 1: Basic data transport function;
Sub-part 2: Test Suite Structure and
Test Purposes (TSS&TP) specification



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Foreword

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

The present document is part 1, sub-part 2 of a multi-part deliverable covering Broadband Radio Access Networks (BRAN); HIPERLAN type 2, Conformance testing for the Data Link Control (DLC) layer, as identified below:

Part 1: "Basic data transport function";

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

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

Sub-Part 3: "Abstract Test Suites (ATS) specification".

Part 2: "Radio Link Control (RLC) sublayer";

Part 3: "Profile for Business Environment";

Part 4: "Extension for Home Environment";

Part 5: "Profile for Home Environment".

1 Scope

The present document contains the Test Suite Structure (TSS) and Test Purposes (TP) to test the BRAN HIPERLAN type 2; Data Link Control (DLC) layer; Part 1: Basic Data Transport Function.

The objective of the present document is to provide a basis for conformance tests for BRAN HIPERLAN type 2 equipment giving a high probability of air interface inter-operability between different manufacturer's BRAN HIPERLAN type 2 equipment.

The ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [3] and ISO/IEC 9646-2 [4]) as well as the ETSI rules for conformance testing (ETS 300 406 [2]) are used as a basis for the test methodology.

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 TS 101 761-1: "Broadband Radio Access Networks (BRAN); HIPERLAN Type 2; Data Link Control (DLC) layer; Part 1: Basic Data Transport Functions".

[2] ETSI ETS 300 406: "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". (See also ITU-T Recommendation X.290 (1995)).

[4] ISO/IEC 9646-2: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract test suite specification". (See also ITU-T Recommendation X.291 (1995)).

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

[6] ISO/IEC 9646-7: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statement".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ISO/IEC 9646-7 [6] and in TS 101 761-1 [1] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations defined in ISO/IEC 9646-1 [3], ISO/IEC 9646-6 [5], ISO/IEC 9646-7 [6], and in TS 101 761-1 [**1**] and the following apply:

AP	Access Point
ARQ	Automatic Repeat Request
BI	Invalid Behaviour
BO	Inopportune Behaviour
BV	Valid Behaviour
CA	Capability tests
DLC	Data Link Control
DUC	DLC User Connection
IUT	Implementation Under Test
LCH	Long CHannel
MAC	Medium Access Control
MT	Mobile Terminal
PDU	Protocol Data Unit
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
RLC	Radio Link Control
TP	Test Purposes
TSS	Test Suite Structure

4 Test suite structure

4.1 Structure

Figure 1 shows the DLC Error Control Test Suite Structure (TSS) including its subgroups defined for the conformance testing.

Test Suite	Protocol group	Protocol subgroup	Test group			
			CA	BV	BI	BO
ERC-AP/ERC-MT	DLC Error Control service	Acknowledge mode	x			
		Repetition mode	x			
		Unacknowledge mode	x			

Figure 1: TSS for HIPERLAN 2 DLC Error Control service

The test suite is structured as a tree with a first level defined as ERC-AP or ERC-MT representing the protocol group "DLC Error Control service for AP and DLC Error Control service for MT".

4.2 Test groups

The test groups are organized in three levels. The first level creates one protocol group representing the protocol services. The second level separates the protocol services in functional modules. The last level in each branch contains one or more of the standard ISO subgroups CA, BV, BI and BO.

4.2.1 Protocol groups

The protocol groups identify the DLC Error Control service, as defined in TS 101 761-1 [1].

4.2.1.1 Transmission mode

The Error Control service group is divided in three functional modules. The first functional module identifies acknowledge mode procedures. The second functional module identifies repetition mode procedures. The last functional module identifies unacknowledge mode procedures.

4.2.2 Main test groups

The main test groups are the capability group, the valid behaviour group, the invalid behaviour group and the inopportune behaviour group.

4.2.2.1 Capability (CA) tests

This test sub group shall provide limited testing of the major IUT capabilities aiming to insure that the claimed capabilities are correctly supported, according to the PICS.

4.2.2.2 Valid Behaviour (BV) tests

This test sub group shall verify that the IUT reacts in conformity with the TS 101 761-1 [1], after receipt or exchange of valid Protocol Data Units (PDUs). Valid PDUs means that the exchange of messages and the content of the exchanged messages are considered as valid.

4.2.2.3 Invalid Behaviour (BI) tests

This test sub group shall verify that the IUT reacts in conformity with the TS 101 761-1 [1], after receipt of a syntactically invalid PDU.

4.2.2.4 Inopportune Behaviour (BO) tests

This test sub group shall verify that the IUT reacts in conformity with the TS 101 761-1 [1], after receipt of a syntactically correct PDU not expected in the actual message exchange.

5 Test Purposes (TP)

5.1 Introduction

5.1.1 TP definition conventions

The TPs are defined following particular rules as shown in table 1.

Table 1: TP definition rules

TP Id according to the TP naming conventions	Reference. Initial condition. Stimulus. Expected behaviour.
TP Id	The TP Id is a unique identifier it shall be specified according to the TP naming conventions defined in the clause 5.1.2.
Reference	The reference should contain the references of the subject to be validated by the actual TP (specification reference, clause, and paragraph).
Condition	The condition defines in which initial state the IUT has to be to apply the actual TP.
Stimulus	The stimulus defines the test event to which the TP is related.
Expected behaviour	Definition of the events that are expected from the IUT to conform to the base specification.

5.1.2 TP naming conventions

The identifier of the TP is built according to table 2.

Table 2: TP naming convention

Identifier:	**TP/<st>/<pg>/<fm>/<x>-<nnn>**		
	<st> = side type	AP	Access Point
		MT	Mobile Terminal
	<pg> = protocol group	ECM	DLC Error Control service
	<fm> = functional module	AM	Acknowledge mode
		RM	Repetition mode
		UM	Unacknowledge mode
	x = Type of testing	CA	Capability Tests
		BV	Valid Behaviour Tests
		BI	Invalid Behaviour Tests
		BO	Inopportune Behaviour Tests
	<nnn> = sequential number	(000-999)	Test Purpose Number

EXAMPLE: TP/MT/ECM/AM/BV-010 is the tenth purpose for the valid behaviour testing of the acknowledge mode procedures of the DLC error control service implemented at MT side.

5.1.3 Sources of TP definitions

All TPs are specified according to TS 101 761-1 [**1**].

5.2 Test purposes for AP

5.2.1 Acknowledge mode

TP/AP/ECM/AM/CA-000	Reference: TS 101 761-1, clause 6.4.2.8 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. IUT has reached its window limit without receiving acknowledgement. Check, that: after receiving a cumulative acknowledgement indicating that the last packet of the window was receive negatively, the IUT advances its window to the lowest negatively acknowledged LCH.
TP/AP/ECM/AM/CA-001	Reference: TS 101 761-1, clause 6.4.2.8 Initial condition: DUC_established. IUT is the receiver. A small window (32) is in use. IUT is not in flow control state. Check, that: the IUT generate at least one cumulative acknowledgement each 2 times round trip time duration.
TP/AP/ECM/AM/CA-002	Reference: TS 101 761-1, clause 6.4.2.9 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: when the IUT has new LCHs waiting for transmission and its transmission windows has not advanced during more than 5 s, the IUT resets the connection.
TP/AP/ECM/AM/CA-003	Reference: TS 101 761-1, clause 6.4.2.9 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: after execution of the reset procedure initiated by the LT, the IUT re-starts transmission with SN number 0.
TP/AP/ECM/AM/CA-004	Reference: TS 101 761-1, clause 6.4.2.9 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. IUT is in flow control state. Check, that: after execution of the reset procedure initiated by the LT, the IUT has leaved the flow control state.
TP/AP/ECM/AM/CA-005	Reference: TS 101 761-1, clause 6.4.2.9 Initial condition: 2 DUC_established connections in acknowledge mode. IUT is the transmitter or the receiver. A small window (32) is in use in each connection. Check, that: after execution of the reset procedure initiated by the LT, the IUT has performed the reset actions for all connections in acknowledged mode.
TP/AP/ECM/AM/CA-006	Reference: TS 101 761-1, clause 6.4.2.10 Initial condition: DUC_established. IUT is the receiver. A small window (32) is in use. Check, that: the IUT negatively acknowledges a LCH with incorrect CRC by setting the corresponding bit to 0 in a next cumulative acknowledgement.
TP/AP/ECM/AM/CA-007	Reference: TS 101 761-1, clause 6.4.2.10 Initial condition: DUC_established. IUT is the receiver. A small window (32) is in use. Check, that: the IUT negatively acknowledges a LCH with SN outside its receiver window by setting the corresponding bit to 0 in a next cumulative acknowledgement.
TP/AP/ECM/AM/CA-008	Reference: TS 101 761-1, clause 6.4.2.10 Initial condition: DUC_established. IUT is the receiver. A small window (32) is in use. Check, that: the IUT positively acknowledges a correct LCH either by setting the corresponding bit to 1 in a next bitmap block or by setting the corresponding bit to 1 in the next cumulative acknowledgement or by a negative acknowledgement of a higher SN in the next cumulative acknowledgement.
TP/AP/ECM/AM/CA-009	Reference: TS 101 761-1, clause 6.4.2.11 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: after receiving two successive logically incorrect ARQ feedback messages, the IUT resets the connection by using the relevant DUCC message.
TP/AP/ECM/AM/CA-010	Reference: TS 101 761-1, clause 6.4.2.11 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: the IUT re-transmits correctly an LCH negatively acknowledged in a cumulative acknowledgement and previously positively acknowledged in a bitmap block. (The IUT has kept the LCH in its buffer until the reception of the cumulative acknowledgement).
TP/AP/ECM/AM/CA-011	Reference: TS 101 761-1, clause 6.4.2.11 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: the IUT transmits new LCHs in consecutive ascending order of their sequence numbers.
TP/AP/ECM/AM/CA-012	Reference: TS 101 761-1, clause 6.4.2.11 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: when the IUT has reached its transmission window limit without receiving cumulative acknowledgement, the IUT stops transmission of new LCHs.

TP/AP/ECM/AM/CA-013	Reference: TS 101 761-1, clause 6.4.2.12.1 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. IUT has sent a discard message. Check, that: when receiving negative acknowledgements for LCHs that it has previously announced in a discard message, the IUT retransmits the discard message
TP/AP/ECM/AM/CA-014	Reference: TS 101 761-1, clause 6.4.2.14 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: upon receiving an ARQ feedback message with the FC bit set (flow control mode), and at least after a round trip time, the IUT sends only LCHs with sequence numbers up to the highest sequence number signalled in the Bitmap Blocks of the received ARQ feedback message.

5.3 Test purposes for MT

5.3.1 Acknowledge mode

TP/MT/ECM/AM/CA-000	Reference: TS 101 761-1, clause 6.4.2.8 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. IUT has reached its window limit without receiving acknowledgement. Check, that: after receiving a cumulative acknowledgement indicating that the last packet of the window was receive negatively, the IUT advances its window to the lowest negatively acknowledged LCH.
TP/MT/ECM/AM/CA-001	Reference: TS 101 761-1, clause 6.4.2.8 Initial condition: DUC_established. IUT is the receiver. A small window (32) is in use. IUT is not in flow control state. Check, that: the IUT generate at least one cumulative acknowledgement each 2 times round trip time duration.
TP/MT/ECM/AM/CA-002	Reference: TS 101 761-1, clause 6.4.2.9 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: when the IUT has new LCHs waiting for transmission and its transmission windows has not advanced during more than 5 s, the IUT resets the connection.
TP/MT/ECM/AM/CA-003	Reference: TS 101 761-1, clause 6.4.2.9 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: after execution of the reset procedure initiated by the LT, the IUT re-starts transmission with SN number 0.
TP/MT/ECM/AM/CA-004	Reference: TS 101 761-1, clause 6.4.2.9 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. IUT is in flow control state. Check, that: after execution of the reset procedure initiated by the LT, the IUT has leaved the flow control state.
TP/MT/ECM/AM/CA-005	Reference: TS 101 761-1, clause 6.4.2.9 Initial condition: 2 DUC_established connections in acknowledge mode. IUT is the transmitter or the receiver. A small window (32) is in use in each connection. Check, that: after execution of the reset procedure initiated by the LT, the IUT has performed the reset actions for all connections in acknowledged mode.
TP/MT/ECM/AM/CA-006	Reference: TS 101 761-1, clause 6.4.2.10 Initial condition: DUC_established. IUT is the receiver. A small window (32) is in use. Check, that: the IUT negatively acknowledges a LCH with incorrect CRC by setting the corresponding bit to 0 in a next cumulative acknowledgement.
TP/MT/ECM/AM/CA-007	Reference: TS 101 761-1, clause 6.4.2.10 Initial condition: DUC_established. IUT is the receiver. A small window (32) is in use. Check, that: the IUT negatively acknowledges a LCH with SN outside its receiver window by setting the corresponding bit to 0 in a next cumulative acknowledgement.
TP/MT/ECM/AM/CA-008	Reference: TS 101 761-1, clause 6.4.2.10 Initial condition: DUC_established. IUT is the receiver. A small window (32) is in use. Check, that: the IUT positively acknowledges a correct LCH either by setting the corresponding bit to 1 in a next bitmap block or by setting the corresponding bit to 1 in the next cumulative acknowledgement or by a negative acknowledgement of a higher SN in the next cumulative acknowledgement.
TP/MT/ECM/AM/CA-009	Reference: TS 101 761-1, clause 6.4.2.11 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: after receiving two successive logically incorrect ARQ feedback messages, the IUT resets the connection by using the relevant DUCC message.

TP/MT/ECM/AM/CA-010	Reference: TS 101 761-1, clause 6.4.2.11 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: the IUT re-transmits correctly an LCH negatively acknowledged in a cumulative acknowledgement and previously positively acknowledged in a bitmap block. (The IUT has kept the LCH in its buffer until the reception of the cumulative acknowledgement).
TP/MT/ECM/AM/CA-011	Reference: TS 101 761-1, clause 6.4.2.11 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: the IUT transmits new LCHs in consecutive ascending order of their sequence numbers.
TP/MT/ECM/AM/CA-012	Reference: TS 101 761-1, clause 6.4.2.11 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: when the IUT has reached its transmission window limit without receiving cumulative acknowledgement, the IUT stops transmission of new LCHs.
TP/MT/ECM/AM/CA-013	Reference: TS 101 761-1, clause 6.4.2.12.1 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. IUT has sent a discard message. Check, that: when receiving negative acknowledgements for LCHs that it has previously announced in a discard message, the IUT retransmits the discard message
TP/MT/ECM/AM/CA-014	Reference: TS 101 761-1, clause 6.4.2.14 Initial condition: DUC_established. IUT is the transmitter. A small window (32) is in use. Check, that: upon receiving an ARQ feedback message with the FC bit set (flow control mode), and at least after a round trip time, the IUT sends only LCHs with sequence numbers up to the highest sequence number signalled in the Bitmap Blocks of the received ARQ feedback message.

History

Document history		
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