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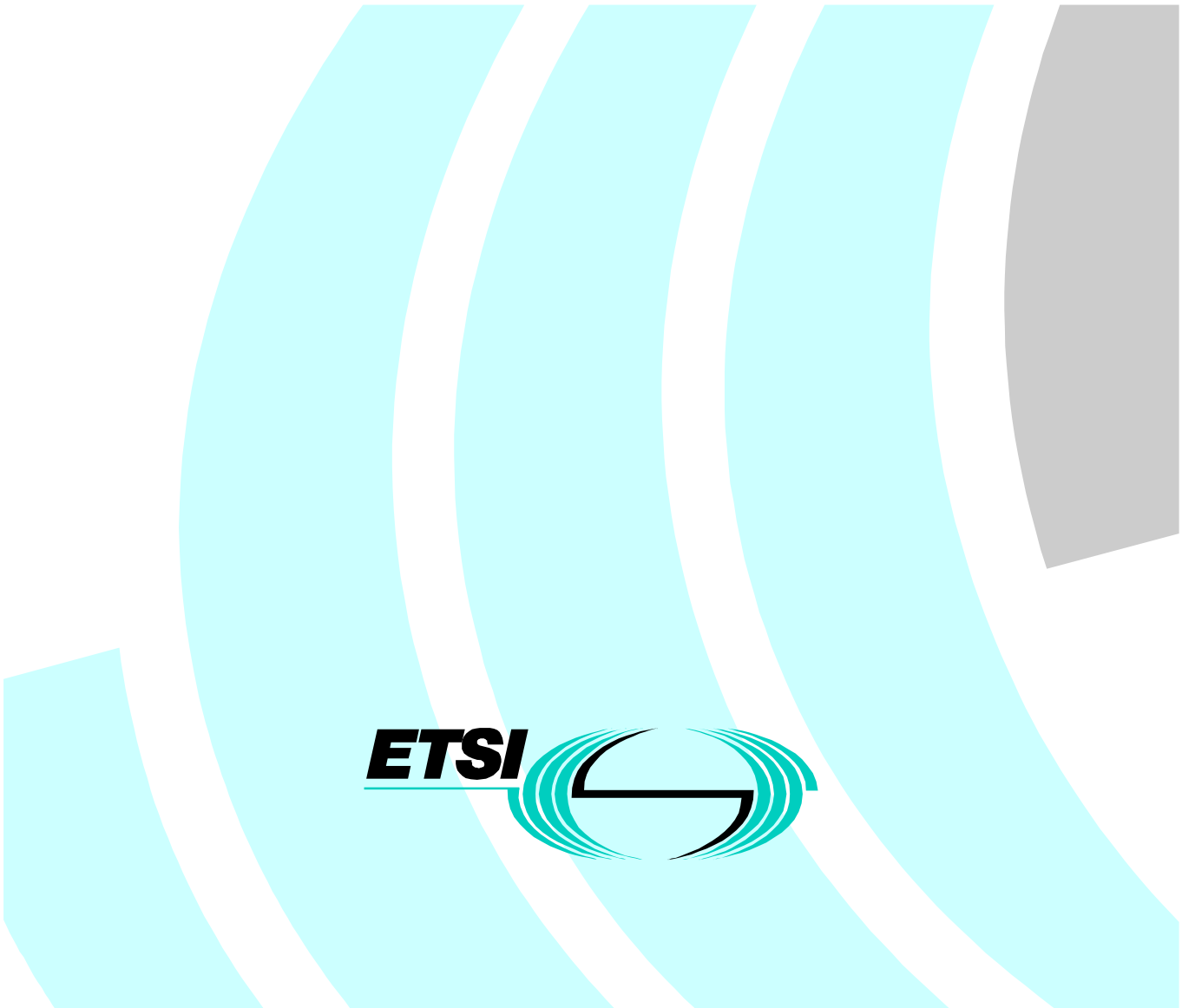
European Standard (Telecommunications series)

Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS) Test Case Library (TCL); Part 4: Test Suite Structure (TSS) and Test Purposes (TP) - Data Link Control (DLC) layer



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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Project Digital Enhanced Cordless Telecommunications (DECT), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

The present document is part 4 of a multi-part EN covering the Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS) Test Case Library (TCL), as identified below:

Part 1: "Test Suite Structure (TSS) and Test Purposes (TP) - Medium Access Control (MAC) layer";

Part 2: "Abstract Test Suite (ATS) - Medium Access Control (MAC) layer - Portable radio Termination (PT)";

Part 3: "Abstract Test Suite (ATS) - Medium Access Control (MAC) layer - Fixed radio Termination (FT)";

Part 4: "Test Suite Structure (TSS) and Test Purposes (TP) - Data Link Control (DLC) layer";

Part 5: "Abstract Test Suite (ATS) - Data Link Control (DLC) layer - Portable radio Termination (PT)";

Part 6: "Abstract Test Suite (ATS) - Data Link Control (DLC) layer - Fixed radio Termination (FT)";

Part 7: "Test Suite Structure (TSS) and Test Purposes (TP) - Network (NWK) layer";

Part 8: "Abstract Test Suite (ATS) - Network (NWK) layer - Portable radio Termination (PT)";

Part 9: "Abstract Test Suite (ATS) - Network (NWK) layer - Fixed radio Termination (FT)".

Proposed national transposition dates	
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1 Scope

The present document contains the Test Suite Structure (TSS) and Test Purposes (TP) to test the DECT Packet Radio Service (DPRS) Data Link Control (DLC) layer.

The objective of this test specification is to provide a basis for conformance tests for DECT equipment giving a high probability of air interface inter-operability between different manufacturer's DECT equipment.

The ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [4] and ISO/IEC 9646-2 [5]) as well as the ETSI rules for conformance testing (ETS 300 406 [3]) 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, 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] EN 300 175-4: "Digital Enhanced Cordless Telecommunications (DECT); Common interface; Part 4: Data link control layer".

[2] EN 301 649: "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Services (DPRS)".

[3] ETS 300 406: "Methods for Testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

[4] ISO/IEC 9646-1 (1991): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts". (See also CCITT Recommendation X.290 (1991)).

[5] ISO/IEC 9646-2 (1991): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract test suite specification". (See also CCITT Recommendation X.291 (1991)).

[6] ISO/IEC 9646-6 (1991): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 6: Protocol profile test specification".

[7] ISO/IEC 9646-7 (1991): "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 following terms and definitions apply:

a) the terms defined in ISO/IEC 9646-7 [7]; and

b) the definitions in EN 300 175-4 [1].

3.2 Abbreviations

For the purposes of the present document, the abbreviations defined in ISO/IEC 9646-1 [4], ISO/IEC 9646-6 [6], ISO/IEC 9646-7 [7], the abbreviations defined in EN 300 175-4 [1] apply. In particular, the following definitions apply:

BI	Invalid Behaviour
BO	Inopportune Behaviour
BV	Valid Behaviour
C/L	Connectionless mode
C/O	Connection Oriented mode
CA	Capability tests
C-plane	Control plane
DECT	Digital Enhanced Cordless Telecommunications
DLC	Data Link Control layer
FP	Fixed Part
FT	Fixed radio Termination
IUT	Implementation Under Test
LAPC	a DLC layer C-plane protocol entity
Lb	a DLC broadcast entity
MAC	Medium Access Control layer
NWK	Network layer
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation Extra Information for Testing
PP	Portable Part
PT	Portable radio Termination
SAPI	Service Access Point Identifier
TP	Test Purpose
TSS	Test Suite Structure
ULI	Unassigned Link Identifier (U-Plane)
U-plane	User plane

4 Test suite structure

4.1 Overview

The Data Link Control (DLC) layer is layer 2b of the DECT protocol stack. The separation of the user information from the DECT signalling data is managed by the allocation of two independent planes:

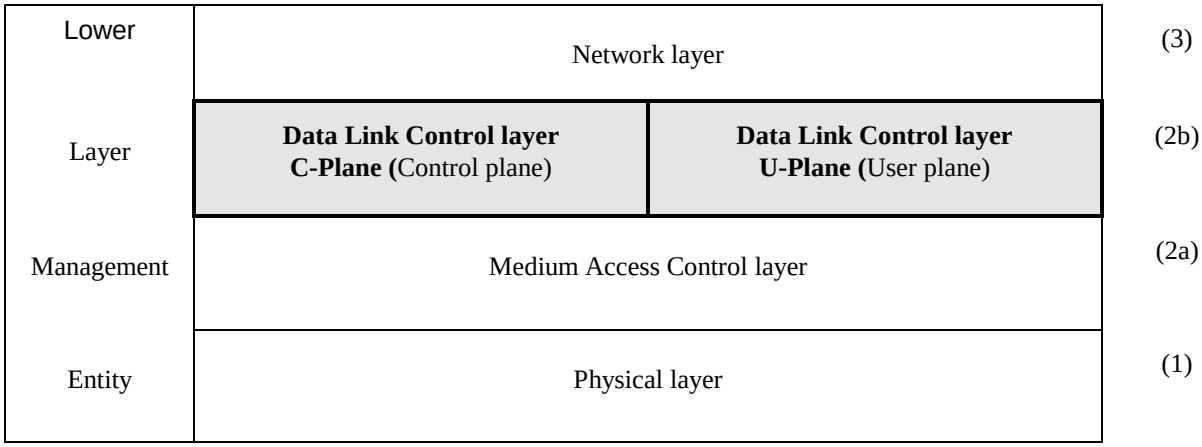

Figure 1: DECT protocol stack

The U-plane is the part of the DLC implementation that is responsible for the transmission of the user data. The U-plane may provide a series of different services and facilities, grouped into categories (LUx families).

The C-Plane is the second part of DECT DLC and is mainly involved with the transfer of signalling information. It provides the means to support DECT Connection Oriented, Connectionless and Broadcast services (the broadcast service exists only at the FT to PT direction). DECT DLC provides three classes of operation (Unacknowledged for C/L services, Single frame and Multiframe for C/O services).

At the DLC layer, C-plane and U-plane resources are considered as completely independent. The association of C and U-plane resources to serve a higher layer service (e.g. to setup and maintain a call) is a NWK layer responsibility. Moreover, no interaction is required between the services provided by each of the planes.

Figure 2 shows the DLC (TSS) including its subgroups and defined for the conformance testing.

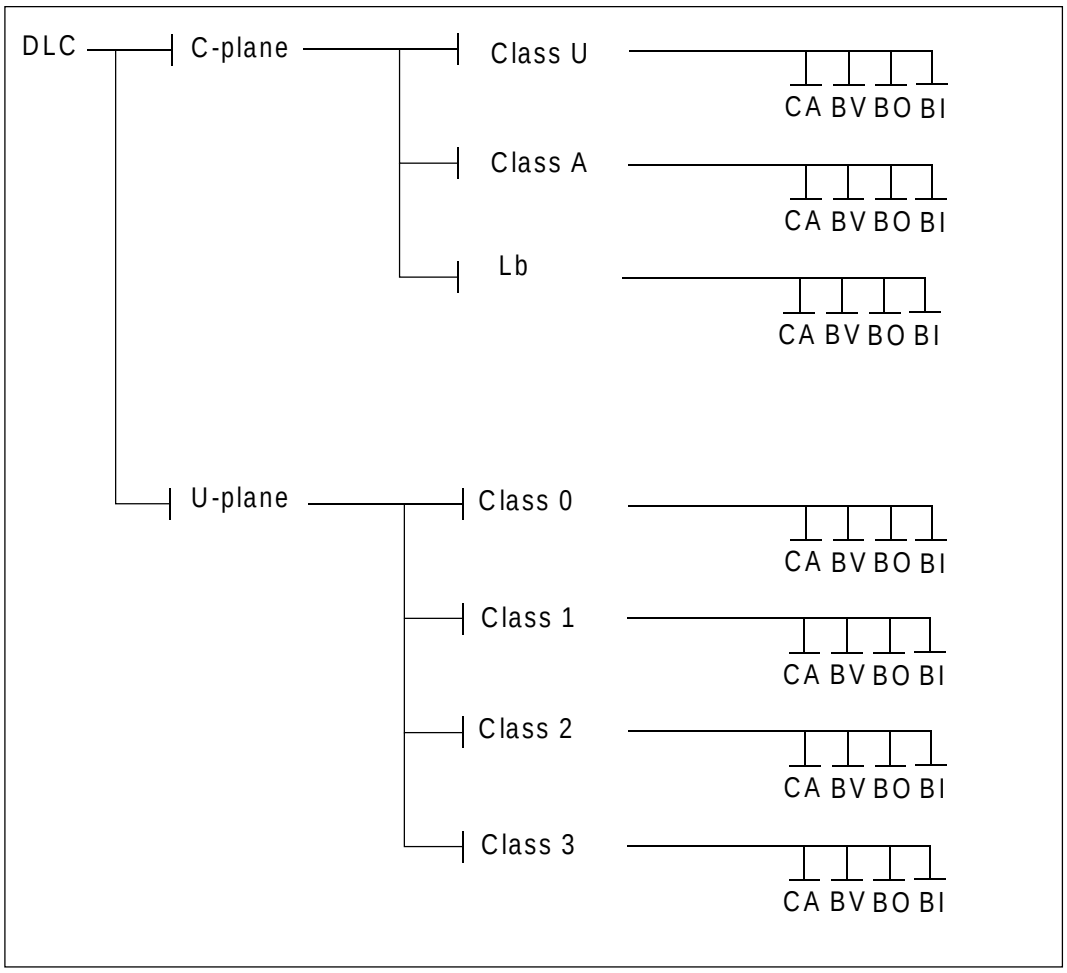

Figure 2: DLC TSS

4.2 Test suite structure (TSS)

The test suite is structured as a tree with a first level defined as DLC representing the protocol group "DLC for Portable Part (PP) and Fixed Part (FP)".

4.3 Test groups

The test groups are organized in three levels. The first level creates two protocol groups representing the protocol plane. The second level separates the protocol plane in functional modules. The last level contains the standard ISO subgroups CA, BV, BO and BI.

4.3.1 Protocol groups

The protocol groups identifies the DECT DLC planes, C-Plane and U-Plane, as defined in EN 300 175-4 [1].

4.3.1.1 C-plane group

The C-plane protocol group is divided in four functional modules. The first functional module identifies the LAPC Class U services. The second functional module identifies the LAPC Class A services. The third functional module identifies the LAPC Class B services. The last functional module identifies the broadcast services Lb.

4.3.1.2 U-plane group

The U-plane protocol group is divided in five functional modules. The first functional module identifies the Class 0 transmission procedures. The second functional module identifies the Class 1 transmission procedures. The third functional module identifies the Class 2 transmission procedures. The forth functional module identifies the Class 3 transmission procedures. The last functional module identifies the LU3 LAP-U protocol.

4.3.2 Main test groups

The main test groups are the Capability group (CA), the Valid Behaviour group (BV), the inopportune Behaviour group (BO) and the Invalid Behaviour group (BI).

4.3.2.1 CApability (CA) tests

This test sub group shall provide limited testing of the major IUT capabilities aiming to assure that the claimed capabilities are correctly supported, in accordance with the PICS.

4.3.2.2 Valid Behaviour (BV) tests

This test sub group shall verify that the IUT reacts in conformity with the standard, on receipt or exchange of a valid Protocol Data Units (PDU). Valid PDU, means, that the exchange of messages and the content of the exchanged messages are considered as valid.

4.3.2.3 InOpportune Behaviour (BO) tests

This test sub group shall verify that the IUT is capable of a valid reaction, when an inopportune protocol event occurs. Such an event is syntactically correct but it occurs when it is not expected.

4.3.2.4 Invalid Behaviour (BI) tests

This test sub group shall verify that the IUT reacts in conformity with the standard, on receipt of a syntactically invalid PDU.

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 subclause below.
Reference	The reference should contain the references of the subject to be validated by the actual TP (specification reference, clause, 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<fm><x>-<nnn>**		
	<fm> =	functional module	U	C-plane Class U services
			A	C-plane Class A services
			L	C-plane Broadcast services
			0	U-plane transmission Class 0
			1	U-plane transmission Class 1
			2	U-plane transmission Class 2
			3	U-plane transmission Class 3
	x =	Type of testing	C	CA, Capability Tests
			V	BV, Valid Behaviour Tests
			O	BO, Inopportune Behaviour Tests
			I	BI, Invalid Behaviour Tests
	<nnn> =	sequential number	(000-999)	Test Purpose Number

5.1.3 Sources of TP definitions

All TPs are specified according to EN 300 175-4 [1] with respect to the requirements expressed in EN 301 649 [2].

5.2 C-plane

5.2.1 Lc Frame delimiting and sequencing service

Test group objective:	To check the behaviour of the Lc Frame delimiting and sequencing service of the DLC layer of the IUT.

5.2.1.1 DLC service and procedure concerned

DPRS - D.8 Lc Frame delimiting and sequencing service		
	C_S channel fragmentation and recombination	EN 300 175-4 [1]: 6.1.2, 6.1.3, 6.1.4, 6.1.4.2
	C_F channel fragmentation and recombination	EN 300 175-4 [1]: 6.1.2, 6.1.3, 6.1.4, 6.1.4.1
	Selection of logical channels (C_S and C_F)	EN 300 175-4 [1]: 10.2.5

5.2.1.2 test purposes

The functions of the LC entity (frame delimiting, checksum generation/checking, fragmentation of DLC frames, and routing of frame to/from logical channels) are implicitly covered by the test purposes designed for the C-plane.

5.2.2 LAPC Class U service

Test group objective:	To check the behaviour of the LAPC Class U service of the DLC layer of the IUT.

5.2.2.1 DLC service and procedure concerned

DPRS - D.7 Data Link Service (LAPC + Lc) class U service		
	Class U use of LLN for unacknowledged information transfer	EN 300 175-4 [1]: 9.3.1
	Class U link establishment	EN 300 175-4 [1]: 9.3.2
	Class U unacknowledged information transfer	EN 300 175-4 [1]: 9.3.3
	Class U unacknowledged release	EN 300 175-4 [1]: 9.3.4

5.2.2.2 CA test purposes

Subgroup objective:	Limited testing of the major IUT capabilities aiming to assure that the LAPC Class U service is correctly supported.

Test purposes:	
TPUC-000	DPRS - D.7 Data Link Service (LAPC + Lc) class U service EN 300 175-4 [1]: 9.3. Only applicable when a procedure is specified in the PIXIT to force the IUT to send an UI frame. Verify that the IUT is able to generate an UI frame by using MAC connectionless services.
TPUC-002	DPRS - D.7 Data Link Service (LAPC + Lc) class U service EN 300 175-4 [1]: 9.3. Only applicable when a procedure is specified in the PIXIT to determine UI frame reception. Verify that the IUT is able to receive an UI frame over MAC connectionless services.
TPUC-003	DPRS - D.7 Data Link Service (LAPC + Lc) class U service EN 300 175-4 [1]: 9.3. Only applicable when a procedure is specified in the PIXIT to determine UI frame reception. Verify that the IUT is able to receive an UI frame over an open MAC connection.

5.2.2.3 BV test purposes

No BV TPs are defined for LAPC Class U service in the present document.

5.2.2.4 BI test purposes

Subgroup objective:	To verify that the IUT reacts in conformity with the standard, on receipt or exchange of a syntactically invalid LAPC Class U service PDU.

Test purposes:	
TPUI-000	DPRS - D.7 Data Link Service (LAPC + Lc) class U service EN 300 175-4 [1]: 9.3.3.2. Only applicable when a procedure is specified in the PIXIT to determine UI frame reception. Verify that the IUT, on receipt of an UI frame with P bit set to '1', accepts this erroneous frame. The UI frame is transmitted over MAC connectionless services.
TPUI-001	DPRS - D.7 Data Link Service (LAPC + Lc) class U service EN 300 175-4 [1]: 9.3.3.2. Only applicable when a procedure is specified in the PIXIT to determine UI frame reception. Verify that the IUT, on receipt of an UI frame with P bit set to '1', accepts this erroneous frame. The UI frame is transmitted over an open MAC connection.
TPUI-002	DPRS - D.7 Data Link Service (LAPC + Lc) class U service EN 300 175-4 [1]: 9.3.3.2. Only applicable when a procedure is specified in the PIXIT to determine UI frame reception. Verify that the IUT, on receipt of an UI frame with NLF bit set to '1', accepts this erroneous frame. The UI frame is transmitted over MAC connectionless services.
TPUI-003	DPRS - D.7 Data Link Service (LAPC + Lc) class U service EN 300 175-4 [1]: 9.3.3.2. Only applicable when a procedure is specified in the PIXIT to determine UI frame reception. Verify that the IUT, on receipt of an UI frame with NLF bit set to '1', accepts this erroneous frame. The UI frame is transmitted over an open MAC connection.
TPUI-004	DPRS - D.7 Data Link Service (LAPC + Lc) class U service EN 300 175-4 [1]: 9.3.3.2. Only applicable when a procedure is specified in the PIXIT to determine UI frame reception. Verify that the IUT discards a UI frame with improper LLN (not Class U operation). The UI frame is transmitted over MAC connectionless services.
TPUI-005	DPRS - D.7 Data Link Service (LAPC + Lc) class U service EN 300 175-4 [1]: 9.3.3.2. Only applicable when a procedure is specified in the PIXIT to determine UI frame reception. Verify that the IUT discards a UI frame with improper LLN (not Class U operation). The UI frame is transmitted over an open MAC connection.
TPUI-006	DPRS - D.7 Data Link Service (LAPC + Lc) class U service EN 300 175-4 [1]: 9.3.3.2. Only applicable when a procedure is specified in the PIXIT to determine UI frame reception. Verify that the IUT discards a UI frame with improper Service Access Point Identifier (SAPI) (not 'connectionless'). The UI frame is transmitted over MAC connectionless services.
TPUI-007	DPRS - D.7 Data Link Service (LAPC + Lc) class U service EN 300 175-4 [1]: 9.3.3.2. Only applicable when a procedure is specified in the PIXIT to determine UI frame reception. Verify that the IUT discards a UI frame with improper SAPI (not ‘connectionless’). The UI frame is transmitted over an open MAC connection.

5.2.3 LAPC Class A service

Test group objective:	To check the behaviour of the LAPC Class A service of the DLC layer of the IUT.

5.2.3.1 DLC service and procedure concerned

DPRS - D.5 Data Link Service (LAPC + Lc) class A service		
	Class A link establishment	EN 301 649 [2]: 11.3.1
	Class A acknowledged information transfer	EN 301 649 [2]: 11.3.2
	Class A link release	EN 301 649 [2]: 11.3.3
	Class A link re-establishment	EN 301 649 [2]: 11.3.4
DPRS - D.11 Inter-cell voluntary connection handover		
	Class A connection handover	EN 301 649 [2]: 11.8.1

5.2.3.2 CA test purposes

Subgroup objective:	Limited testing of the major IUT capabilities aiming to assure that the LAPC Class A service is correctly supported.

Test purposes:	
TPAC-000	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.1. Only for IUT that is able to send the establishment request of the data link. Initial condition: The IUT has sent the link establishment request and is now in establishment pending state. Verify that the IUT re-transmits the same link establishment I-Frame request N250 times if, at each request, the timer <DL-07> expires and the expected RR response frame with the NLF bit set to '1' is not received and enters established state, if in the last re-transmission it receives the expected RR with the NLF bit set to '1'.'
TPAC-001	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.1. Only for IUT that is able to send the establishment request of the data link. Initial condition: The IUT has sent the link establishment request and is now in establishment pending state. Verify that the IUT, on receipt of a valid RR frame response to the link establishment request it has sent, enters established state.
TPAC-002	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.8. Only for IUT that is able to send the establishment request of the data link. Initial condition: The IUT has sent the link establishment request to re-establish the link and is now in re-establishment pending state. Verify that the IUT re-transmits the same link establishment I-Frame request N250 times if, at each request, the timer <DL-07> expires and the expected RR response frame with the NLF bit set to '1' is not received and enters established state, if in the last re-transmission it receives the expected RR with the NLF bit set to '1'.
TPAC-003	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.8. Only for IUT that is able to send the establishment request of the data link. Initial condition: The IUT has sent the link establishment request to re-establish the link and is now in re-establishment pending state. Verify that the IUT, on receipt of a valid RR frame response to the link re-establishment request it has sent, enters established state.
TPAC-005	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.4. Initial condition: The IUT is in Class A established state. Verify that the IUT acknowledges rightly a valid received I-Frame within timer <DL-04>.
TPAC-006	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.6. Initial condition: The IUT is in Class A established state. Verify that the IUT re-transmits N250 times the same I-Frame if, at each transmission, the timer <DL-04> expires and the expected acknowledgement is not received and remains in established state, if in the last re-transmission it receives the expected acknowledgement.
TPAC-007	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.2.1. For IUT that implement only Class A operation (no Class B). Initial condition: The IUT is in Unassigned Link Identifier (ULI) state. Verify that the IUT, on receipt of the Class B link establishment I-Frame request, refuses this request by sending RR response frame with the reserved LLN value "Class A operation" and NLF bit set to "1", and enters into the Class A established state.
TPAC-008	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.1. Initial condition: The IUT is in ULI state. Verify that the IUT, on receipt of a valid link establishment I-Frame request, responds with a RR response frame with the NLF bit set to "1" and enters into the Class A established state.

5.2.3.3 BV test purposes

Subgroup objective:	To verify that the IUT reacts in conformity with the standard, on receipt or exchange of a valid LAPC Class A service PDU.

Test purposes:	
TPAV-000	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.1. Only for IUT that is able to send and to receive the establishment request of the data link. Initial condition: The IUT has sent the link establishment request and is now in establishment pending state (timer <DL-07> is active). Verify that the IUT accepts an I-Frame indicating Class A link establishment, responds with a RR response frame with the NLF bit set and establishes Class A operation. (Collision of establishment requests)
TPAV-002	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.5. Initial condition: The IUT is in Class A established state and has sent an I-Frame. Verify that the IUT accepts as an acknowledgement for a previously transmitted I-Frame, a RR response frame with correct N(R) value.
TPAV-003	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.5. Initial condition: The IUT is in Class A established state and has sent an I-Frame. Verify that the IUT accepts as an acknowledgement for a previously transmitted I-Frame, an I-Frame command with correct N(S) and N(R) values.
TPAV-005	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.6. Initial condition: The IUT is in timer recovery phase. Verify that the IUT accepts as an acknowledgement for a previously transmitted I-Frame, a RR response frame with correct N(R) value and leaves the timer recovery phase.
TPAV-006	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.6. Initial condition: The IUT is in timer recovery phase. Verify that the IUT accepts as an acknowledgement for a previously transmitted I-Frame, an I-Frame with correct N(S) and N(R) values and leaves the timer recovery phase.
TPAV-008	DPRS - D.11 Inter-cell voluntary connection handover EN 300 175-4 [1]: 9.2.7.3.1. Initial condition: The IUT is in established state. Verify that the IUT manages rightly the PT intercell procedure for connection handover.

5.2.3.4 BI test purposes

Subgroup objective:	To verify that the IUT reacts in conformity with the standard, on receipt or exchange of a syntactically invalid LAPC Class A service PDU.

Test purposes:	
TPAI-000	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.1. Only for IUT that is able to send the establishment request of the data link. Initial condition: The IUT has sent the link establishment request and is now in establishment pending state (timer <DL-07> is active). Verify that the IUT, on receipt of a RR Class B response frame with NLF bit set to '1', discards the received frame and, on expiration of the timer <DL-07>, re-transmits the establishment request.
TPAI-001	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.1. Only for IUT that is able to send the establishment request of the data link. Initial condition: The IUT has sent the link establishment request and is now in establishment pending state (timer <DL-07> is active). Verify that the IUT, on receipt of a RR response frame with NLF bit set to '1' and invalid N(R), discards the received RR response frame and, on expiration of the timer <DL-07>, re-transmits the establishment request.
TPAI-002	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.8. Only for IUT that is able to send the establishment request of the data link. Initial condition: The IUT has sent the establishment request to re-establish the link and is waiting for the acknowledgement of the request. Verify that the IUT, on receipt of a RR Class B response frame with NLF bit set to '1', discards the received frame and, on expiration of the timer <DL-07>, re-transmits the re-establishment request.
TPAI-003	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.8. Only for IUT that is able to send the establishment request of the data link. Initial condition: The IUT has sent the establishment request to re-establish the link and is waiting for the acknowledgement of the request. Verify that the IUT, on receipt of a RR response frame with NLF bit set to '1' and invalid N(R), discards the received RR response frame and, on expiration of the timer <DL-07>, re-transmits the re-establishment request.
TPAI-004	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.6. Initial condition: The IUT, in Class A established state, has sent an I-Frame and is waiting for the adequate acknowledgement. Verify that the IUT, on receipt of a RR Class B response frame with NLF bit set to '0', discards the received frame and, on expiration of the timer <DL-04>, re-transmits the unacknowledged I-Frame.
TPAI-005	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.5. Initial condition: The IUT, in Class A established state, has sent an I-Frame and is waiting for the adequate acknowledgement. Verify that the IUT, on receipt of a RR response frame with NLF bit set to '0' and invalid N(R), discards the received RR response frame and, on expiration of the timer <DL-04>, re-transmits the unacknowledged I-Frame.
TPAI-006	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.5. Initial condition: The IUT, in Class A established state, has sent an I-Frame and is waiting for the adequate acknowledgement. Verify that the IUT, on receipt of an I-Frame with invalid N(R), accepts the received frame and, on expiration of the timer <DL-04>, re-transmits the unacknowledged I-Frame with N(R) set to correctly acknowledge the received I-Frame.
TPAI-007	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.4. Initial condition: The IUT, in Class A established state, has sent an I-Frame and is waiting for the adequate acknowledgement. Verify that the IUT, on receipt of an I-Frame with invalid N(S), responds with a RR response frame or an I-Frame indicating in the N(R) field the expected N(S) of the received I-Frame and accepts the N(R) of the I-Frame as an acknowledgement for the previously transmitted frame.

Test purposes:	
TPAI-008	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.6. Initial condition: The IUT, in Class A established state, has sent an I-Frame and is waiting for the adequate acknowledgement. Verify that the IUT, on receipt of an I-Frame with invalid N(S) and invalid N(R), responds with a RR response frame indicating in the N(R) field the expected N(S) of the received I-Frame, and, on expiration of the timer <DL-04>, re-transmits the unacknowledged I-Frame.
TPAI-009	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.6. Initial condition: The IUT is in timer recovery phase. Verify that the IUT, on receipt of a RR Class B response frame with NLF bit set to '0', discards the received frame, it remains in timer recovery phase, and, on expiration of the timer <DL-04>, re-transmits the unacknowledged I-Frame.
TPAI-011	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.6. Initial condition: The IUT is in timer recovery phase. Verify that the IUT, on receipt of an I-Frame with invalid N(R), accepts the received I-Frame and responds with an appropriate RR frame and, on expiration of the timer <DL-04>, re-transmits the unacknowledged I-Frame with N(R) set according to the last accepted I-Frame.
TPAI-012	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.6. Initial condition: The IUT is in timer recovery phase. Verify that the IUT, on receipt of an I-Frame with invalid N(S), responds with an RR response frame or an I-frame, indicating in the N(R) field the expected N(S) of the received I-Frame, and leaves timer recovery phase because the N(R) of the received I-Frame is a valid acknowledgement for the I-Frame it has previously transmitted.
TPAI-013	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.6. Initial condition: The IUT is in timer recovery phase. Verify that the IUT, on receipt of an I-Frame with invalid N(S) and invalid N(R), responds with a RR response frame indicating in the N(R) field the N(S) of the expected I-Frame and, re-transmits the last unacknowledged I-Frame.

5.2.3.5 BO test purposes

Subgroup objective:	To verify that the IUT is capable of a valid reaction, when an inopportune LAPC Class A protocol event occurs.

Test purposes:	
TPAO-000	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.1. Only for IUT that is able to send the establishment request of the data link. Initial condition: The IUT has sent the link establishment request and is now in establishment pending state. Verify that the IUT, on receipt of an I-Frame with NLF bit set to '0', discards the received frame and, on expiration of the timer <DL-07>, re-transmits the establishment request.
TPAO-001	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.1. Only for IUT that is able to send the establishment request of the data link. Initial condition: The IUT has sent the link establishment request and is now in establishment pending state. Verify that the IUT, on receipt of a RR response frame with NLF bit set to '0', discards the received RR response frame and, on expiration of the timer <DL-07>, re-transmits the establishment request.
TPAO-002	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.8. Only for IUT that is able to send the establishment request of the data link. Initial condition: The IUT has sent the establishment request to re-establish the link and is waiting for the acknowledgement of the request. Verify that the IUT, on receipt of an I-Frame with NLF bit set to '0', discards the received frame and, on expiration of the timer <DL-07>, re-transmits the re-establishment request.
TPAO-003	DPRS - D.5 Data Link Service (LAPC + Lc) class A service EN 300 175-4 [1]: 9.2.3.8. Only for IUT that is able to send the establishment request of the data link. Initial condition: The IUT has sent the establishment request to re-establish the link and is waiting for the acknowledgement of the request. Verify that the IUT, on receipt of a RR response frame with NLF bit set to '0', discards the received RR response frame and, on expiration of the timer <DL-07>, re-transmits the re-establishment request.

5.2.4 Broadcast service (Lb)

Test group objective:	To check the behaviour of the Broadcast service of the DLC layer of the IUT.

5.2.4.1 DLC service and procedure concerned

DPRS - D.9 Broadcast Lb service		
	Normal operation	EN 300 175-4 [1]: 6.2.1, 8.3.3.1, 9.4.1.1, 9.4.1.2
	Expedited operation	EN 300 175-4 [1]: 6.2.1, 8.3.3.2, 9.4.2.1, 9.4.2.2

5.2.4.2 CA test purposes

Subgroup objective:	Limited testing of the major IUT capabilities aiming to assure that the Broadcast service is correctly supported.

Test purposes:	
TPLC-000	DPRS - D.9 Broadcast Lb service EN 300 175-4 [1]: 5.2. For Fixed radio termination only. Verify that the IUT is able to generate a broadcast frame of the short frame format (3 octets). For Portable radio termination only. Verify that the IUT is able to receive a broadcast frame of the short frame format (3 octets).
TPLC-001	DPRS - D.9 Broadcast Lb service EN 300 175-4 [1]: 5.2. For Fixed radio termination only. Verify that the IUT is able to generate a broadcast frame of the full frame format (5 octets). For Portable radio termination only. Verify that the IUT is able to receive a broadcast frame of the full frame format (5 octets).
TPLC-data00	DPRS - D.9 Broadcast Lb service EN 300 175-4 [1]: 9.4. For Fixed radio termination only. Verify that the IUT is able to generate a expedited frame of the short frame format (3 octets). For Portable radio termination only. Verify that the IUT is able to receive a expedited frame of the short frame format (3 octets).
TPLC-data01	DPRS - D.9 Broadcast Lb service EN 300 175-4 [1]: 9.4. For Fixed radio termination only. Verify that the IUT is able to generate a expedited frame of the long frame format (5 octets). For Portable radio termination only. Verify that the IUT is able to receive a expedited frame of the long frame format (5 octets).

5.3 U-plane

5.3.1 Class 0 transmission procedures

No TPs are defined for Class 0 transmission procedures in the present document.

5.3.2 Class 1 transmission procedures

No TPs are defined for Class 1 transmission procedures in the present document.

5.3.3 Class 2 transmission procedures

Test group objective:	To check the behaviour of the U-plane Class 2 transmission procedures of the DLC layer of the IUT.

5.3.3.1 DLC service and procedure concerned

DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL)		
	General	EN 300 175-4 [1]: 11.12.1
	Segmentation and transmission class	EN 300 175-4 [1]: 11.12.2
	Data transmission - Send side procedures	EN 300 175-4 [1]: 11.12.3.1
	Data transmission - Receive side procedures	EN 300 175-4 [1]: 11.12.3.2
	U-plane Class 2 - Sending side procedure	EN 300 175-4 [1]: 14.3.4.1
	U-plane Class 2 - Receiving side procedure	EN 300 175-4 [1]: 14.3.4.2
DPRS - D.2 FU10a DPRS - D.3 FU10b DPRS - D.4 FU10c		
	General frame structure	EN 300 175-4 [1]: 12.11.1
	FU10 buffering procedures	EN 300 175-4 [1]: 12.11.2
	Connection handover	EN 300 175-4 [1]: 12.11.3
	Transmission order	EN 300 175-4 [1]: 12.11.4

5.3.3.2 BV test purposes

Subgroup objective:	To verify that the IUT reacts in conformity with the standard, during a valid U-plane LU10 Class 2 procedure.

Test purposes:	
TP2V-data00	DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL) - D.2, D.3, D.4: FU10a, FU10b, FU10c EN 300 175-4 [1]: 14.3.4.1 Initial condition: U plane of the IUT is connected, IUT is transmitting data, A small window size has been negotiated (3 or 4). Usage of symmetric or asymmetric link is selected by PIXIT item. Verify that the IUT, acting as sending entity, adds send sequence number in ascending order to all PDU, and manages rightly the modulus operation.
TP2V-data01	DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL) - D.2, D.3, D.4: FU10a, FU10b, FU10c EN 300 175-4 [1]: 14.3.4.1 Initial condition: U plane of the IUT is connected, IUT is transmitting data, A small window size has been negotiated (3 or 4). Usage of symmetric or asymmetric link is selected by PIXIT item. Verify that the IUT, acting as sending entity, manages rightly the negotiated window size. First, by stopping transmission when the window size is reached without acknowledgement, and second, by progressing in the transmission whenever an acknowledgement is received.
TP2V-data02	DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL) - D.2, D.3, D.4: FU10a, FU10b, FU10c EN 300 175-4 [1]: 14.3.4.1 Initial condition: U plane of the IUT is connected, IUT is transmitting data, A small window size has been negotiated (3 or 4). Usage of symmetric or asymmetric link is selected by PIXIT item. Verify that the IUT, acting as sending entity, retransmits of all outstanding frame starting from the oldest unacknowledged frame when the window size limit is reached.
TP2V-data03	DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL) - D.2, D.3, D.4: FU10a, FU10b, FU10c EN 300 175-4 [1]: 14.3.4.1 Initial condition: U plane of the IUT is connected, IUT is transmitting data, A small window size has been negotiated (3 or 4). Usage of symmetric or asymmetric link is selected by PIXIT item. Verify that the IUT, acting as sending entity, stops any unnecessary retransmission when a valid acknowledgement is received.
TP2V-data04	DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL) - D.2, D.3, D.4: FU10a, FU10b, FU10c EN 300 175-4 [1]: 14.3.4.1 Initial condition: U plane of the IUT is connected, IUT is transmitting data, A small window size has been negotiated (3 or 4). Usage of symmetric or asymmetric link is selected by PIXIT item. Verify that the IUT, acting as sending entity, retransmits a frame for witch a negative acknowledgement has been received.
TP2V-data05	DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL) - D.2, D.3, D.4: FU10a, FU10b, FU10c EN 300 175-4 [1]: 14.3.4.1 Initial condition: U plane of the IUT is connected, IUT is transmitting data, A small window size has been negotiated (3 or 4). Usage of symmetric or asymmetric link is selected by PIXIT item. Verify that the IUT, acting as sending entity, when the window size limit is reached and when one or more PDU expire, transmits a synchronization message that contains the sequence number of the last expired PDU.
TP2V-data06	DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL) - D.2, D.3, D.4: FU10a, FU10b, FU10c EN 300 175-4 [1]: 14.3.4.1 Initial condition: U plane of the IUT is connected, IUT is transmitting data, A small window size has been negotiated (3 or 4). Usage of symmetric or asymmetric link is selected by PIXIT item. Verify that the IUT, acting as sending entity, having sent a synchronization message and having received an acknowledgement for this message, transmits forward new PDU.
TP2V-data07	DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL) - D.2, D.3, D.4: FU10a, FU10b, FU10c EN 300 175-4 [1]: 14.3.4.1 Initial condition: U plane of the IUT is connected, IUT is transmitting data, A small window size has been negotiated (3 or 4). Usage of symmetric or asymmetric link is selected by PIXIT item. Verify that the IUT, acting as sending entity, having sent a synchronization message and having not received an acknowledgement for this message, retransmits the synchronization message and don't transmits any new PDU.
TP2V-data08	DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL) - D.2, D.3, D.4: FU10a, FU10b, FU10c EN 300 175-4 [1]: 14.3.4.2 Initial condition: U plane of the IUT is connected, IUT is receiving data, A small window size has been negotiated (3 or 4). Usage of symmetric or asymmetric link is selected by PIXIT item. Verify that the IUT, acting as receiving entity, ignores a received frame with sequence number outside its receive window.

Test purposes:	
TP2V-data09	DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL) - D.2, D.3, D.4: FU10a, FU10b, FU10c EN 300 175-4 [1]: 14.3.4.2 Initial condition: U plane of the IUT is connected, IUT is receiving data, A small window size has been negotiated (3 or 4). Usage of symmetric or asymmetric link is selected by PIXIT item. Verify that the IUT, acting as receiving entity, ignores a duplicated frame.
TP2V-data10	DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL) - D.2, D.3, D.4: FU10a, FU10b, FU10c EN 300 175-4 [1]: 14.3.4.2 Initial condition: U plane of the IUT is connected, IUT is receiving data, A small window size has been negotiated (3 or 4). Usage of symmetric or asymmetric link is selected by PIXIT item. Verify that the IUT, acting as receiving entity, acknowledges correctly a received synchronization message.
TP2V-data11	DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL) - D.2, D.3, D.4: FU10a, FU10b, FU10c EN 300 175-4 [1]: 14.3.4.2 Initial condition: U plane of the IUT is connected, IUT is receiving data, A small window size has been negotiated (3 or 4). Usage of symmetric or asymmetric link is selected by PIXIT item. Verify that the IUT, acting as receiving entity, accepts a received synchronization message with sequence number outside its receive window
TP2V-data12	DPRS - D.1 LU10 Enhanced Frame Relay service (EFREL) - D.2, D.3, D.4: FU10a, FU10b, FU10c EN 300 175-4 [1]: 14.3.4.2 Initial condition: U plane of the IUT is connected, IUT is receiving data, A small window size has been negotiated (3 or 4). Usage of symmetric or asymmetric link is selected by PIXIT item. Verify that the IUT, acting as receiving entity, when out-of-sequence list of frames becomes in-sequence due to the arrival of one or more missing frames, acknowledges correctly the last frame of the received in-sequence list of frames.

5.3.4 Class 3 transmission procedures

No TPs are defined for Class 3 transmission procedures in the present document.

5.4 Connection handover, Connection modification, and Encryption

5.4.1 Test group objective

Test group objective:	To check the behaviour of the Connection handover, Connection modification, and Encryption service of the DLC layer of the IUT.

5.4.2 DLC service and procedure concerned

DPRS - D.12 Connection modification		
	Connection modification	EN 300 175-4 [1]: 10.2.3
DPRS - D.13 Encryption activation		
	Encryption switching	EN 301 649 [2]: 11.10
	Connection handover of ciphered connection	EN 301 649 [2]: 11.10.2.2
DPRS - D.14 Encryption deactivation		
	Encryption switching	EN 301 649 [2]: 11.10

5.4.3 Test purposes

The behaviour of the Connection modification, and Encryption services of the DLC layer of the IUT are tested at the NWK layer level of the test specification (Part 7 of the present document).

Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

EN 300 175-1: "Digital Enhanced Cordless Telecommunications (DECT); Common interface; Part 1: Overview".

EN 300 175-2: "Digital Enhanced Cordless Telecommunications (DECT); Common interface; Part 2: Physical layer".

EN 300 175-3: "Digital Enhanced Cordless Telecommunications (DECT); Common interface; Part 3: Medium access control layer".

EN 300 175-5: "Digital Enhanced Cordless Telecommunications (DECT); Common interface; Part 5: Network layer".

EN 300 175-6: "Digital Enhanced Cordless Telecommunications (DECT); Common interface; Part 6: Identities and addressing".

EN 300 175-7: "Digital Enhanced Cordless Telecommunications (DECT); Common interface; Part 7: Security features".

EN 300 175-8: "Digital Enhanced Cordless Telecommunications (DECT); Common interface; Part 8: Speech coding and transmission".

EN 300 435: "Digital Enhanced Cordless Telecommunications (DECT); Data Services Profile (DSP); Base standard including interworking to connectionless networks (service types A and B, class 1)".

EN 300 651: "Digital Enhanced Cordless Telecommunications (DECT); Data Services Profile (DSP); Generic data link service (service type C, class 2)".

ETS 300 699: "Digital Enhanced Cordless Telecommunications (DECT); Data Services Profile (DSP); Generic data link service for closed user groups (service type C, class 1)".

EN 300 701: "Digital Enhanced Cordless Telecommunications (DECT); Data Services Profile (DSP); Generic frame relay service with mobility (service types A and B, class 2)".

ETS 300 755: "Digital Enhanced Cordless Telecommunications (DECT); Data Services Profile (DSP); Multimedia Messaging Service (MMS) with specific provision for facsimile services (service type F, class 2)".

ETS 300 757: "Digital Enhanced Cordless Telecommunications (DECT); Data Services Profile (DSP); Low rate messaging service (service type E, class 2)".

EN 301 240: "Digital Enhanced Cordless Telecommunications (DECT); Data Services Profile (DSP); Point-to-Point Protocol (PPP) interworking for internet access and general multi-protocol datagram transport".

History

Document history			
V0.0.2	November 1999	Public Enquiry	PE 200012: 1999-11-24 to 2000-03-24