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Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI) Test Case Library (TCL); Part 5: Abstract Test Suite (ATS) - Data Link Control (DLC) layer

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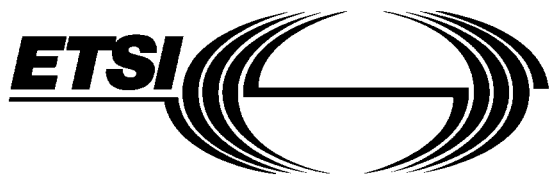
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Part 5: Abstract Test Suite (ATS) - Data Link Control (DLC) layer**

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute (ETSI).

The DECT Test Specification multipart ETS comprises nine parts, as follows:

- Part 1: "Part 1: Test Suite Structure (TSS) and Test Purposes (TP) for Medium Access Control (MAC) layer".
- Part 2: "Part 2: Abstract Test Suite (ATS) for Medium Access Control (MAC) layer - Portable radio Termination (PT)".
- Part 3: "Part 3: Abstract Test Suite (ATS) for Medium Access Control (MAC) layer - Fixed radio Termination (FT)".
- Part 4: "Part 4: Test Suite Structure (TSS) and Test Purposes (TP) - Data Link Control (DLC) layer".
- Part 5: "Part 5: Abstract Test Suite (ATS) - Data Link Control (DLC) layer".**
- Part 6: "Part 6: Test Suite Structure (TSS) and Test Purposes (TP) - Network (NWK) layer - Portable radio Termination (PT)".
- Part 7: "Part 7: Abstract Test Suite (ATS) for Network (NWK) layer - Portable radio Termination (PT)".
- Part 8: "Part 8: Test Suite Structure (TSS) and Test Purposes (TP) - Network (NWK) layer - Fixed radio Termination (FT)".
- Part 9: "Part 9: Abstract Test Suite (ATS) for Network (NWK) layer - Fixed radio Termination (FT)".

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Date of adoption of this ETS:	16 August 1996
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1 Scope

This European Telecommunication Standard (ETS) contains the Abstract Test Suite (ATS) to test the DECT DLC layer.

The objective of this test specification is to provide a basis for approval 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 [21], ISO/IEC 9646-2 [22], ISO/IEC 9646-3 [23] and ISO/IEC 9646-5 [25]) as well as the ETSI rules for conformance testing (ETS 300 406 [29] and ETR 141 [30]) are used as basis for the test methodology.

Test specifications for the Physical Layer (PHL), Medium Access Control Layer (MAC), and Network Layer (NWK) are provided in other the DECT standards.

Annex A provides the Tree and Tabular Combined Notation (TTCN) part of this ATS.

Annex B provides the Partial Protocol Implementation eXtra Information for Testing (PIXIT) Proforma of this ATS.

Annex C provides the Protocol Conformance Test Report (PCTR) Proforma of this ATS.

2 Normative references

This ETS incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] ETS 300 175-1 (1992): "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common interface; Part 1: Overview".
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- [2] ETS 300 175-2 (1992): "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common interface; Part 2: Physical layer".
- [3] ETS 300 175-3 (1992): "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common interface; Part 3: Medium access control layer".
- [4] ETS 300 175-4 (1992): "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common interface; Part 4: Data link control layer".
- [5] ETS 300 175-5 (1992): "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common interface; Part 5: Network layer".
- [6] ETS 300 175-6 (1992): "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common interface; Part 6: Identities and addressing".
- [7] ETS 300 175-7 (1992): "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common interface; Part 7: Security features".
- [8] ETS 300 175-8 (1992): "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common interface; Part 8: Speech coding and transmission".

- [9] ETS 300 175-9 (1992): "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common interface; Part 9: Public access profile".
- [10] ETS 300 444: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Generic Access Profile (GAP)".
- [11] ETS 300 370: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) inter-working profile; Access and mapping (Protocol/procedure description for 3,1 kHz speech service)".
- [12] ETS 300 434: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT) and Integrated Services Digital Network (ISDN) inter-working for end system configuration".
- [13] ETS 300 331: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); DECT Authentication Module (DAM)".
- [14] CCITT Recommendation G.726 (1991): "40, 32, 24, 16 kbit/s adaptive differential pulse code modulation (ADPCM)".
- [15..20] Reserved values.
- [21] 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)).
- [22] 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)).
- [23] ISO/IEC 9646-3 (1991): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The tree and tabular combined notation". (See also CCITT Recommendation X.292 (1992)).
- [24] ISO/IEC 9646-4 (1991): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 4: Test realisation". (See also CCITT Recommendation X.292 (1992)).
- [25] ISO/IEC 9646-5 (1991): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 5: Requirements on test laboratories and clients for the conformance assessment process". (See also CCITT Recommendation X.292 (1992)).
- [26] ISO/IEC 9646-6 (1991): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 6: Protocol profile test specification".
- [27] ISO/IEC 9646-7 (1991): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation conformance statement".
- [28] ISO 7498: "Information Processing Systems - Open Systems Interconnection - Basic Reference model".
- [29] ETS 300 406 (1995): "Methods for Testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

- [30] 91/263/EEC: "Council Directive of 29 April 1991 on the approximation of the laws of the Member states concerning telecommunications terminal equipment, including the mutual recognition of their conformity. (Terminal Directive)".
- [31..40] Reserved values.
- [41] I-ETS 300 176: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Approval test specification".
- [42] TBR 6: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); General terminal attachment requirements".
- [43] TBR 10: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); General terminal attachment requirements: Telephony applications".
- [44] TBR 11 (1992): "Radio Equipment and Systems (RES); Attachment requirements for terminal equipment for Digital European Cordless Telecommunications (DECT) Public Access Profile (PAP) applications".
- [45] ETS 300 323 (1994): "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Public Access Profile (PAP) test specification".
- [46] ETS 300 476: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Protocol Implementation Conformance Statement (PICS) proforma".
- [47] ETS 300 497: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI) Test Case Library (TCL)".
- [48] ETS 300 474: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Generic Access Profile (GAP); Profile requirement list and profile specific Implementation Conformance Statement (ICS) proforma".
- [49] ETS 300 494: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Generic Access Profile (GAP); Profile Test Specification (PTS)".
- [50] TBR 22: "Radio Equipment and Systems (RES); Attachment requirements for terminal equipment for Digital Enhanced Cordless Telecommunications (DECT) Generic Access Profile (GAP) applications".

3 Definitions and abbreviations

Refer to ETS 300 175-1 [1] for the main DECT listing of definitions, symbols and abbreviations. For the purposes of this ETS, the following definitions apply:

3.1 DECT definitions

C-plane: The control plane of the DECT protocol stacks, which contains all of the internal DECT protocol control, but may also include some external user information.

NOTE 1: The C-plane stack always contains protocol entities up to and including the network layer.

DLC data link (DLC link): An association between two DLC layer entities. This can either be one C-plane association or one U-plane association.

NOTE 2: This is not the same as a MAC connection.

DLC Frame: The format used to structure all messages that are exchanged between DLC layer peer entities.

NOTE 3: Different DLC frames are used in the C-plane and the U-plane, and there is more than one format of DLC frame in each plane.

Fixed radio Termination (FT): A logical group of functions that contains all of the DECT processes and procedures on the fixed side of the DECT air interface.

NOTE 4: A FT only includes elements that are defined in the ETS 300 175 [1] to [9]. This includes radio transmission elements (layer 1) together with a selection of layer 2 and layer 3 elements.

flow control: The mechanism that is used to regulate the flow of data between two peer entities.

fragment: One of the service data units that is produced by the process of fragmentation.

NOTE 5: This is not the same as a segment.

fragmentation: The process of dividing a protocol data unit into more than one service data unit for delivery to a lower layer. The reverse process is recombination.

NOTE 6: This is not the same as segmentation.

Lower Layer Management Entity (LLME): A management entity that spans a number of lower layers, and is used to describe all control activities which do not follow the rules of layering.

NOTE 7: The DECT LLME spans the network layer, the DLC layer, the MAC layer and the physical layer.

Portable radio Termination (PT): A logical group of functions that contains all of the DECT processes and procedures on the portable side of the DECT air interface.

NOTE 8: A PT only includes elements that are defined in ETS 300 175 [1] to [9]. This includes radio transmission elements (layer 1) together with a selection of layer 2 and layer 3 elements.

Radio Fixed Part (RFP): One physical sub-group of a fixed part that contains all the radio end points (one or more) that are connected to a single system of antennas.

segment: One of the pieces of data that is produced by the process of segmentation.

NOTE 9: In general, one segment only represents a portion of a complete message.

segmentation: The process of partitioning one service data unit from a higher layer into more than one protocol data unit. The reverse process is assembly.

sequencing (sequence numbering): The process of adding a sequence number to a set of data packets so that the packets can be reassembled in the correct order, regardless of the order in which they are received. See also segmentation.

U-plane: The user plane of the DECT protocol stacks. This plane contains most of the end-to-end (external) user information and user control.

NOTE 10: The U-plane protocols do not include any internal DECT protocol control, and it may be null at the network layer and at the DLC layers for some services.

3.2 DECT abbreviations

For the purposes of this ETS, the following DECT abbreviations apply:

ALI	Assigned Link Identifier. A LAPC operational state
ARQ	Automatic Repeat Request
ASM	Assigned Link Identifier with Synchronous Mode
BRAT	Basic Rate Adaptation service
C-Plane	Control Plane. See definitions
C/L	ConnectionLess mode. See definitions
C/O	Connection Oriented mode. See definitions
DECT	Digital Enhanced Cordless Telecommunications
DLC	Data Link Control
FB _N	Frame Buffer (unprotected)
FB _P	Frame Buffer (protected)
FMID	Fixed part MAC Identity. (MAC layer)
FP	Fixed Part. See definitions
FREL	Frame RELay service
FSWI	Frame SWItching service
FT	Fixed radio Termination. See definitions
LAPC	a DLC layer C-plane protocol entity
Lb	a DLC layer C-plane protocol entity
Lc	a DLC layer C-plane protocol entity
LLME	Lower Layer Management Entity (see definitions)
MAC	Medium Access Control
NWK	Network
PDU	Protocol Data Unit
PMID	Portable Part MAC Identity (MAC layer)
PP	Portable Part. See definitions
PT	Portable radio Termination. See definitions
RFP	Radio Fixed Part (see definitions)
SAP	Service Access Point
SAPI	Service Access Point Identifier
SDU	Service Data Unit
SEL	Selective
SRAT	Secondary Rate Adaptation service
TDMA	Time Division Multiple Access
TRUP	Transparent Unprotected service
ULI	Unassigned Link Identifier
U-Plane	User Plane (see definitions)

3.3 ISO definitions

For the purposes of this ETS, the following ISO definitions apply:

Implementation Under Test (IUT): See ISO/IEC 9646-1 [21];

System Under Test (SUT): See ISO/IEC 9646-1 [21];

Abstract Test Suite (ATS): See ISO/IEC 9646-1 [21];

Point of Control and Observation (PCO): See ISO/IEC 9646-1 [21];

Protocol Conformance Test Report (PCTR): See ISO/IEC 9646-5 [25];

Protocol Implementation Conformance Statement (PICS): See ISO/IEC 9646-1 [21];

Protocol Implementation eXtra Information for Testing (PIXIT): See ISO/IEC 9646-1 [21];

PCTR proforma: See ISO/IEC 9646-5 [25];

PICS proforma: See ISO/IEC 9646-1 [21];

PIXIT proforma: See ISO/IEC 9646-1 [21];

Lower Tester (LT): See ISO/IEC 9646-1 [21];

Upper Tester (UT): See ISO/IEC 9646-1 [21];

Network layer (NWK): See ISO 7498 [28];

Physical Layer (PHL): See ISO 7498 [28].

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3.4 ISO abbreviations

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For the purposes of this ETS, the following ISO abbreviations apply:

ASP	Abstract Service Primitive
BI	Invalid Behaviour
BO	Inopportune Behaviour
BV	Valid Behaviour
CA	Capability tests
ETS	European Telecommunication Standard
ISO	International Organisation for Standardisation
IUT	Implementation Under Test
LT	Lower Tester
NWK	Network Layer
PDU	Protocol Data Unit
PHL	Physical Layer
PICS	Protocol Implementation Conformance Statements
PIXIT	Protocol Implementation eXtra Information for Testing
SUT	System Under Test
TC	Test Case
TP	Test Purpose
TSS	Test Suite Structure
UT	Upper Tester

4 Abstract Test Method (ATM)

This clause describes the ATM used for testing the DECT DLC protocol. It is the embedded variant of Remote Single (RSE) layer test method. The RSE test method has been selected, because:

- this test method implies no specific requirements from the IUT;
- the Upper Service Access Point (USAP) of the IUT cannot be directly observed;
- the variety of the possible DECT implementations is a serious technical obstacle for the adoption of a different ATM;
- this test method places the minimum limitations in the realisation of conformance testing.

The embedded variant of the remote test method provides sufficient control of the IUT DLC behaviour, through NWK layer messages conveyed by DLC frames.

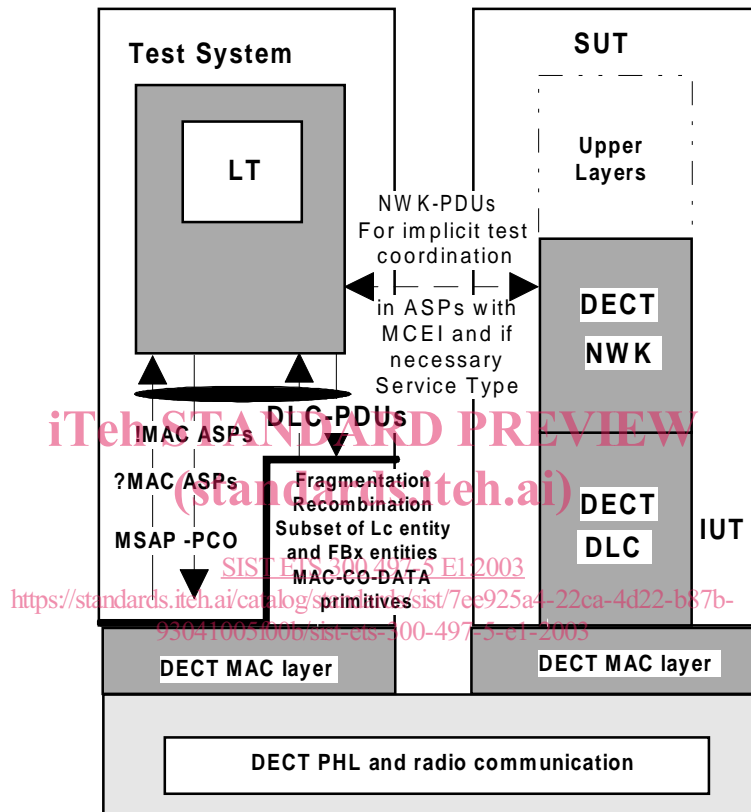


Figure 1: RS test Method embedded variant

- LT** A lower tester (LT) is located in a remote DECT test system. It controls and observes the behaviour of the IUT.
- MSAP** A unique MAC SAP is defined at the DECT interface and used to exchange service data of the DLC protocol. To avoid the complexity of data fragmentation and recombination testing, the SAP is defined below this functions of the DLC layer.
- PCO** The PCO for DLC layer testing is located on the MSAP. All test events at the PCO are specified in terms of MAC ASPs and DLC layer PDUs.
- Notional UT** No explicit upper tester (UT) exists in the system under test. Nevertheless, some network messages are sent to the SUT for the need of the co-ordination procedures. The network layer of the SUT is used as a notional UT as defined in ISO 9646.

The MSAP primitives are defined according to ETS 300 175-3 [3] clause 8 and associated subclauses.