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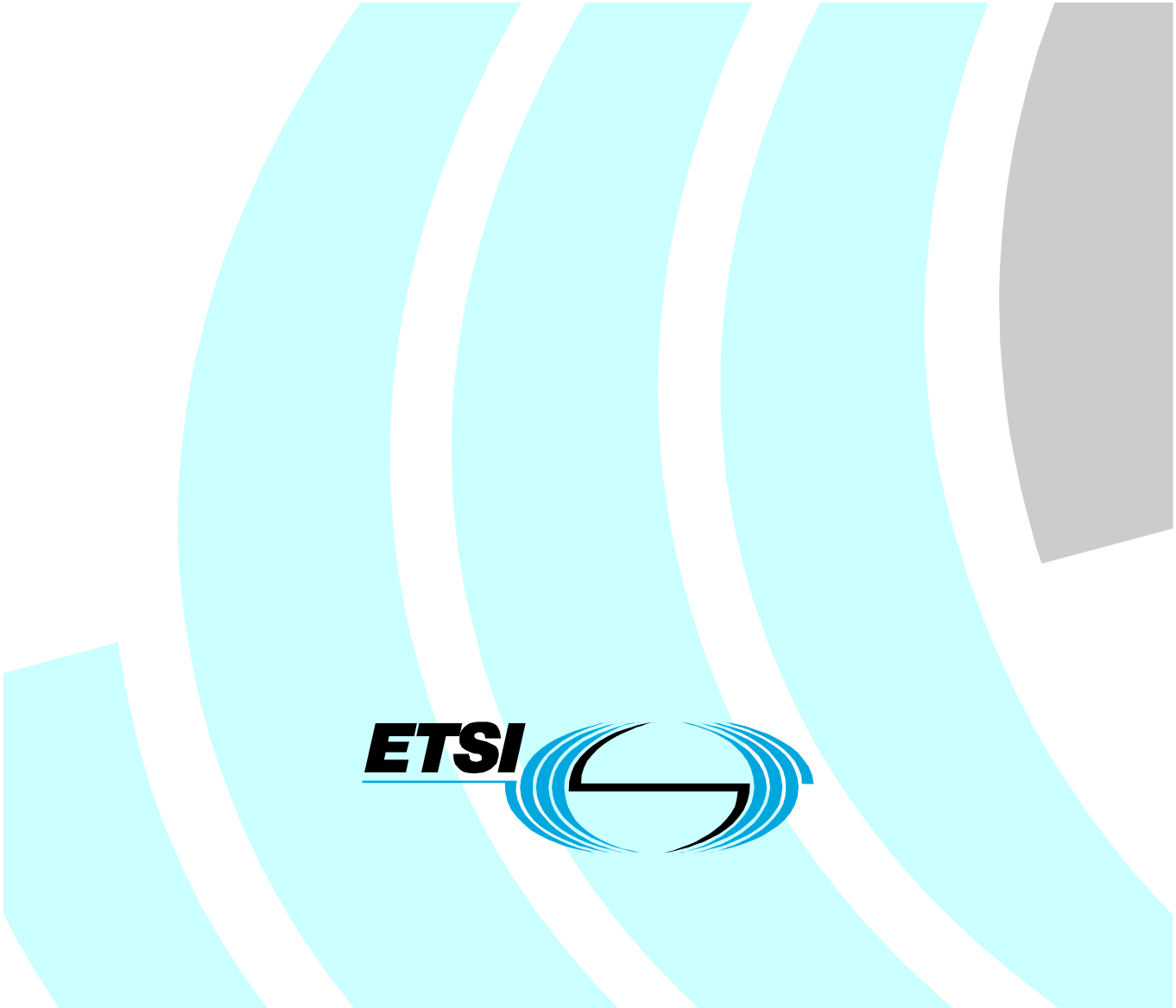
Technical Report

Digital Enhanced Cordless Telecommunications (DECT); Conformance testing on DECT equipment



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Contents

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Foreword

This Technical Report (TR) has been produced by ETSI Project Digital Enhanced Cordless Telecommunications (DECT).

1 Scope

The present document attempts to provide an introduction in DECT testing. It gives a general overview on the DECT system, an introduction on testing and DECT testing in particular. It further shows how an ETSI customer can use the DECT test standards.

The present document contains an abstract of the DECT standard, the ISO/IEC 9646 [56] to [62] standard and the resulting issues from applying the requirements and techniques of ISO/IEC 9646 on the DECT protocol stack, together with a set of examples derived from the currently available test specification material from the Test suites for different DECT layers.

The present document is not an overall description of DECT system concepts for which reference should be made to the relevant DECT standard documents, neither a guidance in testing methodology and framework, for which reference should be made to ISO/IEC 9646 documents.

It is outside the scope of the present document to define specific equipment or particular implementation of such a product intended to realize the considered ATSs for DECT testing.

2 References

For the purposes of this Technical Report (TR) the following references apply:

[1] Directive 99/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).

[2] Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).

[3] Directive 98/13/EC of the European Parliament and of the Council of 12 February 1998 relating to telecommunications terminal equipment and satellite earth station equipment, including the mutual recognition of their conformity.

[4] ETSI TR 101 178: "Digital Enhanced Cordless Telecommunications (DECT); A High Level Guide to the DECT Standardization".

[5] ETSI EN 300 175-1: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 1: Overview".

[6] ETSI EN 300 175-2: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 2: Physical Layer (PHL)".

[7] ETSI EN 300 175-3: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 3: Medium Access Control (MAC) layer".

[8] ETSI EN 300 175-4: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 4: Data Link Control (DLC) layer".

[9] ETSI EN 300 175-5: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 5: Network (NWK) layer".

[10] ETSI EN 300 175-6: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 6: Identities and Addressing".

[11] ETSI EN 300 175-7: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 7: Security features".

[12] ETSI EN 300 175-8: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 8: Speech coding and transmission".

[13] ETSI EN 300 176-1: "Digital Enhanced Cordless Telecommunications (DECT); Approval test specification; Part 1: Radio".

[14] ETSI EN 300 176-2: "Digital Enhanced Cordless Telecommunications (DECT); Approval test specification; Part 2: Speech".

[15] ETSI EN 300 370: "Digital Enhanced Cordless Telecommunications (DECT); Global System for Mobile communications (GSM); DECT/GSM Interworking Profile (IWP); Access and mapping (protocol/procedure description for 3,1 kHz speech service)".

[16] ETSI EN 300 434 (all parts): "Digital Enhanced Cordless Telecommunications (DECT);Integrated Services Digital Network (ISDN); DECT/ISDN interworking for end system configuration".

[17] ETSI EN 300 444: "Digital Enhanced Cordless Telecommunications (DECT); Generic Access Profile (GAP)".

[18] ETSI EN 300 466: "Digital Enhanced Cordless Telecommunications (DECT); Global System for Mobile communications (GSM); DECT/GSM Interworking Profile (IWP); General description of service requirements; Functional capabilities and information flows".

[19] ETSI EN 300 474 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Generic Access Profile (GAP); Profile requirement list and profile specific Implementation Conformance Statement (ICS) proforma".

[20] ETSI EN 300 476 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Protocol Implementation Conformance Statement (PICS) proforma".

[21] ETSI EN 300 494 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Generic Access Profile (GAP); Profile Test Specification (PTS)".

[22] ETSI EN 300 497 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Test Case Library (TCL)".

[23] ETSI EN 301 614 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Integrated Services Digital Network (ISDN); DECT/ISDN interworking for intermediate system configuration".

[24] ETSI EN 300 757: "Digital Enhanced Cordless Telecommunications (DECT); Low Rate Messaging Service (LRMS) including Short Messaging Service (SMS)".

[25] ETSI EN 300 822: "Digital Enhanced Cordless Telecommunications (DECT); Integrated Services Digital Network (ISDN); DECT/ISDN interworking for intermediate system configuration; Interworking and profile specification".

[26] ETSI EN 301 238: "Digital Enhanced Cordless Telecommunications (DECT); Data Services Profile (DSP); Isochronous data bearer services with roaming mobility (service type D, mobility class 2)".

[27] ETSI EN 301 241 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Integrated Services Digital Network (ISDN); DECT/ISDN interworking for intermediate system configuration; Profile Implementation Conformance Statement (ICS)".

[28] ETSI EN 301 242: "Digital Enhanced Cordless Telecommunications (DECT); Global System for Mobile communications (GSM); DECT/GSM integration based on dual-mode terminals".

[29] ETSI EN 301 406: "Digital Enhanced Cordless Telecommunications (DECT); Harmonized EN for Digital Enhanced Cordless Telecommunications (DECT) covering essential requirements under article 3.2 of the R&TTE Directive; Generic radio".

[30] ETSI EN 301 439: "Digital Enhanced Cordless Telecommunications (DECT); Global System for Mobile communications (GSM); Attachment requirements for DECT/GSM dual-mode terminal equipment".

[31] ETSI EN 301 440: "Digital Enhanced Cordless Telecommunications (DECT); Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment for DECT/ISDN interworking profile applications".

[32] ETSI EN 301 469 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS) Test Case Library (TCL)".

[33] ETSI EN 301 489-6: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 6: Specific conditions for Digital Enhanced Cordless Telecommunications (DECT) equipment".

[34] ETSI EN 301 649: "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS)".

[35] ETSI EN 301 650: "Digital Enhanced Cordless Telecommunications (DECT); DECT Multimedia Access Profile (DMAP); Application Specific Access Profile (ASAP)".

[36] ETSI TS 101 859 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); DECT Multimedia Access Profile (DMAP); Application Specific Access Profile (ASAP); Profile Test Specification (PTS)".

[37] ETSI TS 101 869 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Services (DPRS); Profile requirement list and profile specific Implementation Conformance Statement (ICS) proforma".

[38] ETSI TS 101 871 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Application Specific Access Profile (ASAP); DECT Multimedia Access Profile (DMAP); Profile requirement list and profile specific Implementation Conformance Statement (ICS) proforma".

[39] ETSI TS 101 942: "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS); Application Specific Access Profile (ASAP): Ethernet (Eth) Interworking".

[40] ETSI TS 101 945 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Data Services Profile (DSP); Isochronous data bearer services with roaming capability (Service Type D, mobility class 2); Profile requirement list and profile specific Implementation Conformance Statement (ICS) proforma".

[41] ETSI TS 101 946 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Low Rate Messaging Service (LMRS) including Short Message Service (SMS); Profile requirement list and profile specific Implementation Conformance Statement (ICS) proforma".

[42] ETSI TS 101 947: "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS); Application Specific Access Profile (ASAP): V.24 Interworking".

[43] ETSI TS 101 950: "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS); Interoperability Test Specification".

[44] ETSI TS 102 011 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS); Application Specific Access Profile (ASAP): V.24 Interworking; Profile Implementation Conformance Statement (ICS)".

[45] ETSI TS 102 012: "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS); Application Specific Access Profile (ASAP): V.24 Interworking; Profile Test Specification (PTS)".

[46] ETSI TS 102 013 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS); Application Specific Access Profile (ASAP): Ethernet Interworking; Profile Implementation Conformance Statement (ICS)".

[47] ETSI TS 102 014: "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS); Application Specific Access Profile (ASAP): Ethernet Interworking; Profile Test Specification (PTS)".

[48] ETSI ETS 300 331: "Digital Enhanced Cordless Telecommunications (DECT); DECT Authentication Module (DAM)".

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

[50] ETSI ETS 300 704 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Global System for Mobile communications (GSM); DECT/GSM Interworking Profile (IWP); Profile Implementation Conformance Statement (ICS)".

[51] ETSI ETS 300 705 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Integrated Services Digital Network (ISDN); DECT/ISDN interworking for end system configuration; Profile Implementation Conformance Statement (ICS)".

[52] ETSI ETS 300 758 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Integrated Services Digital Network (ISDN); DECT/ISDN interworking for end system configuration; Profile Test Specification (PTS)".

[53] ETSI ETS 300 759: "Digital Enhanced Cordless Telecommunications (DECT); DECT Authentication Module (DAM); Test specification for DAM".

[54] ETSI ETS 300 760: "Digital Enhanced Cordless Telecommunications (DECT); DECT Authentication Module (DAM); Implementation Conformance Statement (ICS) proforma specification".

[55] ETSI ETS 300 825: "Digital Enhanced Cordless Telecommunications (DECT); 3 Volt DECT Authentication Module (DAM)".

[56] ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".

[57] ISO/IEC 9646-2: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract Test Suite specification".

[58] ISO/IEC 9646-3: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The Tree and Tabular Combined Notation (TTCN)".

[59] ISO/IEC 9646-4: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 4: Test realization ".

[60] ISO/IEC 9646-5: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 5: Requirements on test laboratories and clients for the conformance assessment process".

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

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

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ISO/IEC 9646-1 [56] and EN 300 175, parts 1 [5] to 8 [12]) apply.

3.2 Abbreviations

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

ADPCM	Adaptive Differential Pulse Code Modulation
ATC	Abstract Test Cases
ATM	Abstract Test Method
ATS	Abstract Test Suite
CI	Common Interface
CP	Coordination Point

DCS	Dynamic Channel Selection
DLC	Data Link Control
ETS	Executable Test Suite
FP	Fixed Part
FT	Fixed radio Termination
GAP	Generic Access Profile
GR	Graphical Rendition
GSM	Global System for Mobile communication
ICS	Implementation Conformance Statement
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
IUT	Implementation Under Test
IWU	Inter Working Unit
IXIT	eXtra Information for Testing
LAPD	Link Access Procedure on the D-channel
LLME	Lower Layer Management Entity
LT	Lower Tester
MAC	Medium Access Control
MP	Machine Processable
MTC	Main Test Component
NWK	NetWorK
OSI	Open Systems Interconnection
PAP	Public Access Profile
PCO	Point of Control and Observation
PHL	PHysical Layer
PHY	PHYsical
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PCTR	Protocol Conformance Test Report
PDU	Protocol Data Units
PP	Portable Part
PSTN	Public Switched Telephone Network
PT	Portable radio Termination
PTC	Parallel Test Component
RL	Requirement List
RSE	Remote SinglE layer (test method)
SAP	Service Access Point
SUT	System Under Test
TC	Test Case
TCL	Test Case Library
TP	Test Purpose
TSS	Test Suite Structure
TTCN	Tree and Tabular Combined Notation
UL	Upper Layer
U-SAP	Upper Service Access Point
UT	Upper Tester

4 Introduction to the DECT system and DECT standards

4.1 General description of the system

DECT is based on a micro-cellular radio communication system that provides low-power radio (cordless) access between a DECT handset and DECT Fixed Parts (FPs) at ranges up to a few hundred meters.

The basic technical characteristics are defined in EN 300 175-1 [5].

The protocols are designed to support uncoordinated system installation and an efficient sharing of the radio spectrum is achieved using a so-called Dynamic Channel Selection (DCS) mechanism.

The DECT protocols provide internal mechanisms supporting intracell and intercell handover of calls in progress allowing maintaining a high quality of service when transparently re-connecting a Portable Part (PP) to another FP, another physical channel, bearer or connection.

The DECT reference model defines a functional configuration in which a DECT system is attached to a DECT local network, which in turn may be attached to a global network. In general, a DECT system supports the services offered by the global or DECT local networks to which it is attached (e.g. Public Switched Telephone Network (PSTN), Integrated Services Digital Network (ISDN), Global System for Mobile communication (GSM). Separate standards define the inter-working with ISDN and GSM networks.

A more complete description of the various components, services and applications of the DECT standardization, is contained in TR 101 178 [4].

4.2 Protocol architecture

4.2.1 General

The structure of the DECT standard is based on the layered principles used in the International Organization for Standardization (ISO) Open Systems Interconnection (OSI) model. The complete DECT Common Interface (CI) corresponds to the lower 3 layers of the ISO OSI model, but 4 layers of protocols are defined. The top of the DECT Network (NWK) layer (the highest DECT layer) corresponds to the top of the OSI layer 3, but the intermediate boundaries has no OSI equivalent.

4.2.2 Physical layer (PHL)

The PHL layer specifies radio parameters such as frequency, timing, bit and slot synchronization and transmitter and receiver performance. The PHL layer is defined in EN 300 175-2 [6].

4.2.3 Medium Access Control (MAC) layer

The MAC layer provides a broadcast message control service, a connectionless message control service, and multi-bearer (connection oriented) control service, by selecting physical channels and allocating logical channels. The MAC layer is defined in EN 300 175-3 [7].

4.2.4 Data Link Control (DLC) layer

The DLC layer is concerned with the provision of reliable data links to the NWK layer. Its function can be compared to the ISDN layer 2 Link Access Procedure on the D-channel (LAPD) protocol. The DLC layer is defined in EN 300 175-4 [8].

4.2.5 Network (NWK) layer

The NWK layer is the main signalling layer of the protocol stack, containing the functions for call control, mobility management, connection oriented message service, connectionless message service and supplementary services. The NWK layer is defined in EN 300 175-5 [9].

4.2.6 Lower Layer Management Entity (LLME)

The LLME contains defined procedures that concern more than one layer. It contains all functions needed for inter-working between the different layers. The LLME procedures are defined in EN 300 175 part 3 [7] to part 5 [9].

4.2.7 Inter-Working Units (IWU)

The IWUs are required for the communication with the fixed network or with higher layer applications within the PP and FP, e.g. DECT-GSM inter-working profile. The DECT IWU functions are defined in separate standards.

5 Overview on conformance testing

5.1 Scope of conformance testing

Conformance testing is concerned with the assessment of the extent to which a real product or service, based on a standard, actually conforms to the standard.

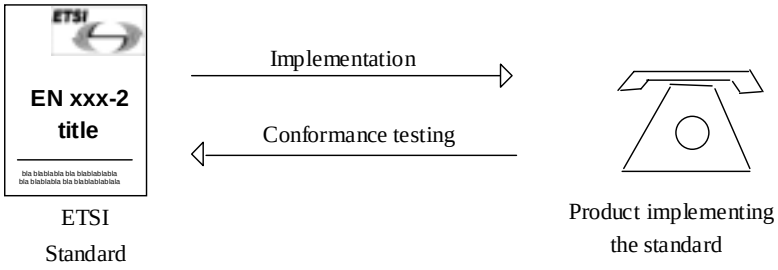

Figure 1

Conformance testing does not add constraints in addition to standards. Conformance testing means testing against the conformance requirements in the standards. The publication of conformance testing standards is not an indirect means to constrain a technology more than the reference standards themselves do.

5.2 Importance and value of conformance testing

The primary objective of conformance testing is to increase the probability that the product, or service, will actually perform correctly the functions it is aimed at. In general, this means to increase the probability that different products based on the same standard will inter-operate.

It should be emphasized that exhaustive testing is impractical on both technical and economical grounds, and even theoretically impossible, and therefore conformance testing cannot guarantee conformance to a standard.

Conformance testing has value only against good standards. The result of conformance testing will be meaningful to a user (e.g. the procurer of a product) if the standard itself is meaningful, i.e. if the fact to implement the standard guarantees in itself a certain degree of interoperability between products.

Initially developed in the OSI context, and thus limited to OSI communication protocols and information objects, the conformance testing has a wider scope in the field of telecommunications, for which it can cover systems, interfaces, services, etc. according to the real needs.

5.3 Benefits of a standard methodology and standard test specifications

Any test can be contentious. When comparing a product to a specification, using concrete tools, it is normal to consider:

- Is the product wrong?
- Is the specification ambiguous?
- Is the test biased?
- Is the method adapted?

One way to solve some of these questions is to standardize, i.e. standardize a methodology and standardize test specifications.

The use of standard methods and test procedures, based on approved test specifications developed in time for every standard, lead to the comparability of test results produced by different testers, and thereby to the mutual recognition of test reports.

In other words, the benefits of a standard methodology and standard test specifications are:

- The means to test early, via the availability of test specifications;
- The means to test once, the need for repeated testing being minimized by the achieved comparability of test results;
- The means to test at low cost, by avoiding repeated test campaigns, and using test specifications developed once;
- The flexibility to allow test by a supplier (1st party testing), by a procurer (2nd party testing), or by an independent laboratory (3rd party testing).

5.3.1 A standardized methodology

Initially developed in ISO and the International Consultative Committee for Telegraph and Telephone (CCITT, now ITU), the conformance testing methodology covers all the aspects that participate to the harmonization of testing procedures: testing methods, development of test specifications, test realization on concrete means of testing, relations between client and laboratory during the conformance assessment process.

The chief principle of this methodology is to respect the freedom to develop and use different test tools, provided that they are based on the same test methods and specifications: the test results will be equivalent. For this reason, the testing methods are called Abstract Testing Methods (ATMs), and the test specifications are called Abstract Test Specifications (ATSs).

5.3.2 Standardized test specifications

Standardized test specifications are essential in order for tests run in different laboratories and with different test tools to have comparable results.

The art of the conformance test specified resides in finding the good compromise, so that the test campaigns provide a reasonable level of confidence at a reasonable cost. Optimization is always sought, i.e. best ratio coverage/cost.

5.4 What is the use of conformance testing?

Conformance testing may be used in two main contexts.

1) Outside any framework, i.e. as a technical activity, by a supplier or a user. This is aimed at validating a product during its development, before releasing it, or when purchasing it. An agreement between the supplier and the procurer of a product can make the acceptance of the product dependent upon the result of this test.

2) In the voluntary certification framework, i.e. in order to attach, if the tests are passed, a certificate to the product. The conformance testing specifications are the technical basis for any certification framework.

5.5 Reference testing documents

ISO/IEC 9646-1 [56] is the chief basis of conformance testing, and covers all related aspects, from the development of test specifications to the conformance assessment process.

ETS 300 406 [49] provides rules and guidance on the test specifications developed for standardization

5.6 Technical overview

5.6.1 What is tested?

An open system is not tested globally, but, according to the architecture of the standards, each part of the system implementing a different standard is tested separately. In the OSI model, each layer is tested separately.

The part of a system tested against a given standard is called the Implementation Under Test (IUT), whereas the whole system is called the System Under Test (SUT).

The IUT is the part of the SUT implementing the tested protocol (see figure 2).

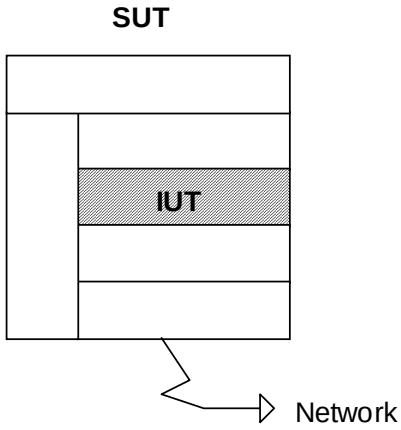

Figure 2

5.6.2 Testing methods

In order to run the tests, the tester will communicate with the IUT at different points, in order to observe the events at protocol level, and also to trigger given elements of behaviour in the IUT.

These points, where the tester communicates with the IUT, are called Points of Control and Observation (PCOs).

The IUT is tested as a black box, i.e. the tester never accesses points inside the IUT, but only examines the external behaviour of the IUT.

Generally, the tester cannot access directly the IUT, which is not separable from other elements of the SUT. Accessing points inside the SUT is generally complex and costly. Often, the SUT is also treated as a black box.

The PCOs are situated at the boundary, or inside the SUT. Depending on the number and the location of the PCOs an ATM is defined.

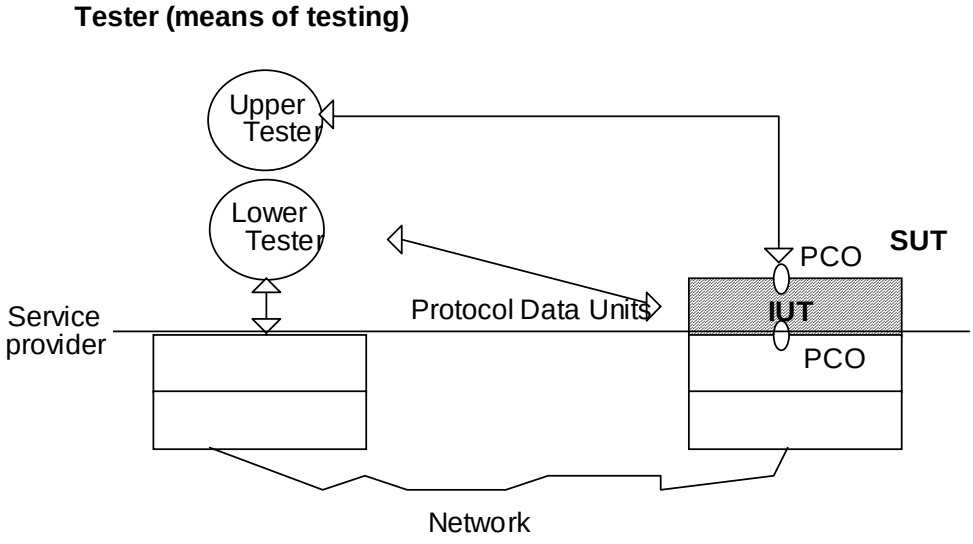

Figure 3: Example of PCOs with the test of a protocol layer

In figure 3 the "lower" PCO, where the protocol of the IUT is observed, is considered to be just below the IUT, ignoring the fact that part of the service provider is within the SUT.

Several classes of test methods are defined. When several PCOs are defined at the protocol level (i.e. the IUT communicates with several other systems concurrently, these other systems being simulated by testers) and the method belongs to a multi-party testing context.

5.6.3 What set of tests?

To each particular element of communication to be tested (syntax, semantics, or behaviour), called conformance requirement of the standard, corresponds a particular Test Purpose (TP).

The TPs are organized with a tree structure (groups and subgroups) according to the functionality of the protocol and the types of tests.

When the test method has been chosen, Test Cases (TCs) are specified, corresponding to the TPs.

Each TC is described from the point of view of the behaviour of the tester, with the constraints on the data exchanged between the tester and the IUT. The TC describes how the verdict shall be assigned according to the different possible behaviours. The verdict may be Pass, Fail or Inconclusive.

The TCs are called Abstract Test Cases (ATCs) because they are independent of their realization on a particular test tool. The set of ATCs for a given standard is called an Abstract Test Suite (ATS). The implementation of the ATS on a particular tester produces executable tests used in the testing process. The set of executable TCs is called the Executable Test Suite (ETS).

5.6.4 Tree and Tabular Combined Notation (TTCN): A notation for test suites

ISO/IEC 9646-3 [58] defines a dedicated notation, called TTCN, for specifying abstract TCs.

Tree, because TTCN describes the behaviour of the tester as a tree of events and actions, leading to verdict assignments (at the leaves). TTCN allows to expect several alternative behaviours of the IUT, and to assign different verdicts to the different observed behaviours.

Tabular, because a Graphical Rendition (GR) form of TTCN presents all the elements of the test suite in tables.

Another form of TTCN, semantically equivalent, is Machine Processable (MP).

Devoted syntactical editors exist for TTCN, and allow the writing of test suites in a more or less assisted manner, with syntax checks.

The TTCN MP can be exchanged between syntactical editors, and can also be compiled on some testers. Several test tool providers propose TTCN compilers or translators as inputs to their testers. However, the compilation of the TTCN never provides the executable test suite totally automatically, since additional information is needed, which depends on each real tester.

A special feature of TTCN is available to describe parallel behaviours, for instance when several testers are use concurrently in a multi-party context. This feature is called Concurrent TTCN. It is part of the TTCN syntax.

5.6.5 Adapting the tester to the tested: Implementation Conformance Statement (ICS) and eXtra Information for Testing (IXIT)

Before a tester is "connected" to a SUT to run the tests, the tester is adapted to the particular SUT.

The tester needs to know the response to two types of questions.

1) Have the options of the standard have been implemented in the IUT?

- A standard contains not only mandatory requirements but also conditional and optional ones.
- In order to test the conformance of a particular IUT, the capabilities and options actually implemented must be declared in a particular document, called Implementation Conformance Statement (ICS), the format of which is standardized, as a questionnaire to be completed by the supplier of the IUT. The ICS proforma is in principle a part of the protocol standard itself.

- The ICS describes in a standardized way the implementation of a standard (see figure 4).

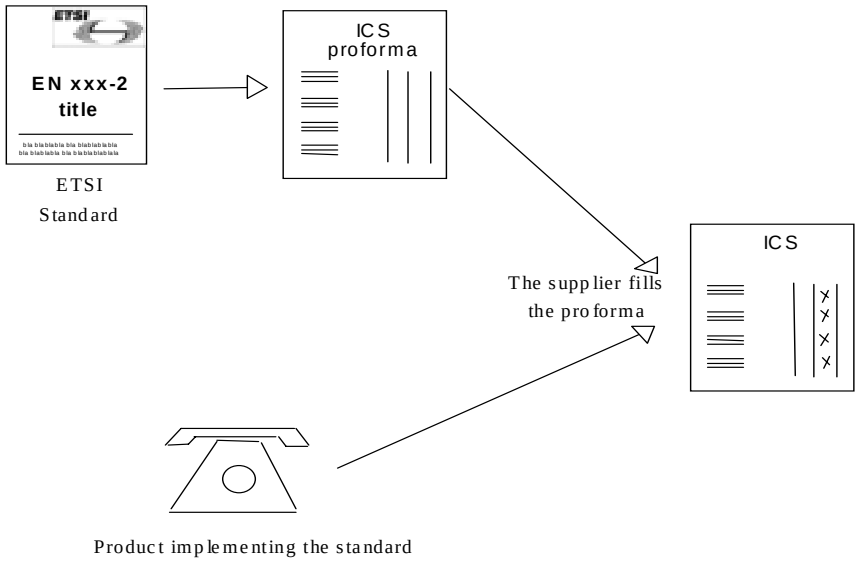

Figure 4

2) Are there other characteristics of the SUT (not specified in the standard) essential for the testing process?

- The tester needs to know other characteristics of the IUT or of the whole SUT, such as the characteristics of other layers in the SUT, the network addresses, etc.

- This additional information is gathered as another document called eXtra Information for Testing (IXIT). The format of the IXIT is also standardized as a questionnaire associated with the test suite used.

5.6.6 What conformance assessment process?

ISO/IEC 9646-5 [60] defines the different steps of the conformance assessment process, underlying the test service provided.

The selection of the actual list of tests to be run against a particular IUT is made according to implementation choices declared in the ICS, and also to information in the IXIT.

This process is in fact called de-selection, because the basic principle is that all the tests will be run, unless there is a good reason that prevents a test to be run (e.g. because it corresponds to an option that was not implemented in the IUT (ICS de-selection) or because it is impractical for a given IUT (IXIT de-selection)). It is necessary to justify why a test will not be run, but it is not necessary to justify why a test should be run.

The result of the test itself is a set of traces and logs, from which is derived, generally with the help, of an expert, a final test report, (Protocol Conformance Test Report (PCTR)), in accordance with a standardized format.

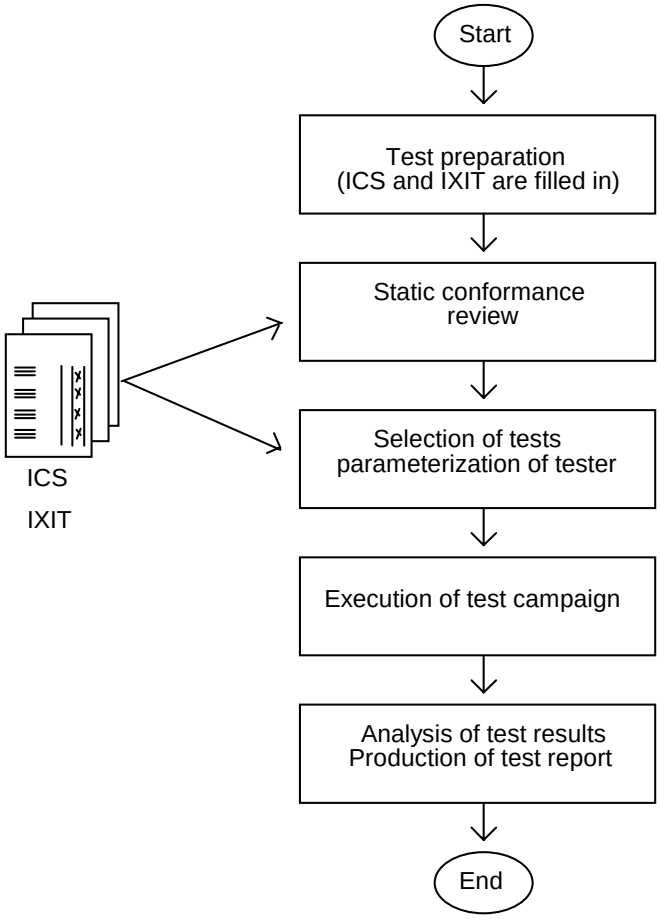

Figure 5

6 DECT testing

6.1 Scope of testing

The test specifications provide a base for DECT equipment validation. The test specifications will give good confidence in protocol conformity and interoperability of equipment provided by various manufactures and which have been tested against the test specifications. However the test specifications do not provide extensive testing.

The test specifications are split and structured in a way that partial testing of the interface side, Fixed radio Termination (FT) or Portable radio Termination (PT), as well as testing against the DECT base specification or against single DECT profiles, is possible.

6.2 DECT Test Specification for R&TTE Directive

Since 2000 a new Terminal Directive 99/5/EC (R&TTE Directive [1]) is coming into force which considers substantially less requirements to be essential than the old Directive 98/13/EC [3] and those are limited to the avoidance of harm or interference to third parties. Conformity to the essential requirements of the R&TTE Directive [1] is by supplier's declaration, and may be based on Harmonized Standards, or other means. The Directive contains essential requirements that are to be met.

The Terminal Directive is only applicable to terminals. It is not applicable to equipment, which is part of a network. The location of the network termination point (NTP) is therefore very important. If the DECT FP is connected to the NTP then the FT is a terminal equipment and subject to the Terminal Directive. If the NTP is the air interface then the FT shall be part of the network and not subject to the Terminal Directive. In general a PP is always a terminal. However, in the case of ISDN IS or the RAP profiles the NTP may be considered as the replicated network interface at the PP if the PP is supplied by the network operator. In this case the PP may not be terminal equipment.

EN 301 406 [29] provides the Harmonized Standard for R&TTE Directive of DECT equipment.

6.3 DECT Test Specification for EMC

Like all other electronic equipment sold in EU member states, DECT equipment is subject to the requirements of the EMC directive 89/336/EEC [2]. It is the responsibility of ETSI to produce the standards, which define the actual EMC performance requirements for compliance to the directive. The Technical Committee for EMC and Radio Spectrum Matters (TC ERM) is responsible for writing all EMC standards.

The relevant EMC standard for DECT equipment is EN 301 489-6 [33]. This standard specifies both performance requirements and the methods to check conformance to the requirements.

Outside Europe other EMC standards may be applicable according to local regulations.

6.4 DECT Test Specification for conformance

6.4.1 Conformance test standard

6.4.1.1 Structure

Table 1 shows the general structure of a conformance test standard. The table shows the components of the standard in addition to the common ETSI standards layout.

Table 1: Structure of a protocol conformance test standard

Document type	Components associated with the document type
TSS and TP	- Test Suite Structure - Test Purposes
ATS	- Abstract Test Method - ATS Conventions - ATS - Partial PIXIT - PCTR proforma

6.4.1.2 Test Suite Structure (TSS)

The TSS reflects the structure of the test specifications in terms of subjects and requirements, which are covered. The TSS represents an adequate coverage of the protocol conformance requirements.

6.4.1.3 Test Purposes (TP)

For all relevant protocol conformance requirements a TP will be defined. A TP focuses on a single protocol conformance requirement and gives indication how it will be tested.

6.4.1.4 Abstract Test Method (ATM)

The ATM defines in an abstract manner how the IUT will be accessed for the purpose of conformance tests. The ATM is always related to a particular ATS. It might be necessary to define several ATMs, and respective ATSs to allow TC definition for all protocol conformance requirements.

6.4.1.5 ATS conventions

To achieve consistency within an ATS on the use of the TTCN notation as well as on implementation aspects, conventions are agreed. This convention will be followed during development and later maintenance, they ease understanding for the developer as well as for the user.

6.4.1.6 ATS

The ATS is a set of TCs, which is based on the TSS&TP. The TCs for the higher DECT layers, above the PHL layer, are defined in the TTCN notation ISO/IEC 9646-3 [58].

6.4.1.7 Partial Protocol Implementation eXtra Information for Testing (PIXIT)

The PIXIT is a set of tabled questions, which shall primarily provide information about the testing environment of the IUT. Besides address and parameter values it also provides information about the invocation of implicit events.

6.4.1.8 PCTR proforma

The PCTR records the conformance status of the IUT obtained during a test campaign.

6.4.2 Profile conformance test standard

6.4.2.1 Structure

Table 2 shows the general structure of a profile conformance test standard. The table shows the components of the standard in addition to the common ETSI standards layout.

Table 2: Structure of profile conformance test standard

Document type	Components associated with the document type
Profile Test Specification	- Relevant Test Case List - Test Cases replacement list - Additional Test Cases list - Modified selection expressions - Profile IXIT proforma

6.4.2.2 Relevant TCs list

This clause provides a list of TCs defined in other test specifications, which are relevant for the protocol profile and will be thus applied for its conformance testing.

6.4.2.3 TCs replacement list

This clause provides a list of TCs, which have to be replaced or modified in an existing test specification for the purpose of protocol profile testing.

6.4.2.4 Additional TCs list

This clause provides a list of TCs to cover additional profile specific requirements.

6.4.2.5 Modified selection expressions

This clause defines how the selection expressions have to be modified for protocol profile testing.

6.4.2.6 Profile IXIT proforma

The Profile IXIT defines the necessary modifications and additions to the PIXITs of the base standard test specification regarding the profile test specification.

6.4.3 Presentation of DECT conformance test specifications

This clause gives an introduction to the various DECT test standards.

6.4.3.1 Test Specifications relevant for Radio

The objective of the EN 300 176-1 [13] approval test specification is to provide a basis for voluntary tests on the PHY layer RF aspects. EN 300 176-1 [13] covers testing of radio frequency parameters, security elements and those DECT protocols that facilitate the radio frequency tests and efficient use of frequency spectrum. It includes optional tests for physical (radio) interfaces to GAP, DECT/GSM, DECT/ISDN protocols testing. These tests apply for equipment implementing the profiles.

The aims of the standard are to ensure:

- Efficient use of frequency spectrum;
- No harm done to any connected network and its services;
- No harm done to other radio networks and services;
- No harm done to other DECT equipment or its services;
- Inter working of terminal equipment via the public network;

through testing those provisions of EN 300 175, parts 1 [5] to 8 [12], which are relevant to these aims.

6.4.3.2 Test Specifications relevant for Telephony

The objective of the EN 300 176-2 [14] approval test specification is to provide a basis for voluntary tests on 3,1 kHz speech telephony aspects. EN 300 176-2 [14] describes testing of DECT 32 kbit/s ADPCM speech requirements between network interface and DECT PT, or between a DECT CI air interface and alternatively a DECT PT or FT. Part B is not applicable to terminal equipment specially designed for the disabled (e.g. with amplification of received speech as an aid for the hard-of-hearing).

The aims of the standard are to ensure:

- Efficient use of frequency spectrum;
- No harm done to any connected network and its services;
- No harm done to other radio networks and services;
- No harm done to other DECT equipment or its services;
- Inter-working of terminal equipment via the public network;

through testing those provisions of EN 300 175, parts 1 [5] to 8 [12], which are relevant to these aims.

6.4.3.3 Test Specifications relevant for Protocols and Profile

6.4.3.3.1 DECT CI test specification

The objective of the EN 300 497 [22] test specifications is to provide a basis for protocol conformance and approval tests for DECT equipment giving a high probability of air interface inter-operability between different manufacturer's DECT equipment. The test specification is based on EN 300 175, parts 3 [7] to 8 [12]. As this test specification will provide the base for all other DECT test specifications, it is also called Test Case Library (TCL).

6.4.3.3.1.1 Medium Access Control (MAC) layer testing

The message exchange between the PHL and the MAC layer is very time critical. Due to this fact, it is not possible to derive from an ATS, applying the conventional Remote Single Layer (RSL) test method, an executable test suite. Instead of generating a test sequence on a PCO between the PHL and the MAC layer, which can be controlled and observed, a particular test scenario is executed on the PCO above the MAC layer. Then the expected test behaviour is only observed on the PCO between the PHL layer and the MAC layer. Observed means the expected behaviour is only defined in terms of receive events. This test method was chosen for the following reasons:

- The ATM is less time critical. An ATS based on this ATM can be implemented as the events of the Physical layer PCO could be traced and a later automatic off-line analyse based on the ATC is possible (as only receive events are defined);
- This ATM is ISO/IEC 9646 [56] to [62] conformant.

This test method allows valid behaviour tests to be carried out, but it is not possible to generate invalid or inopportune test events.

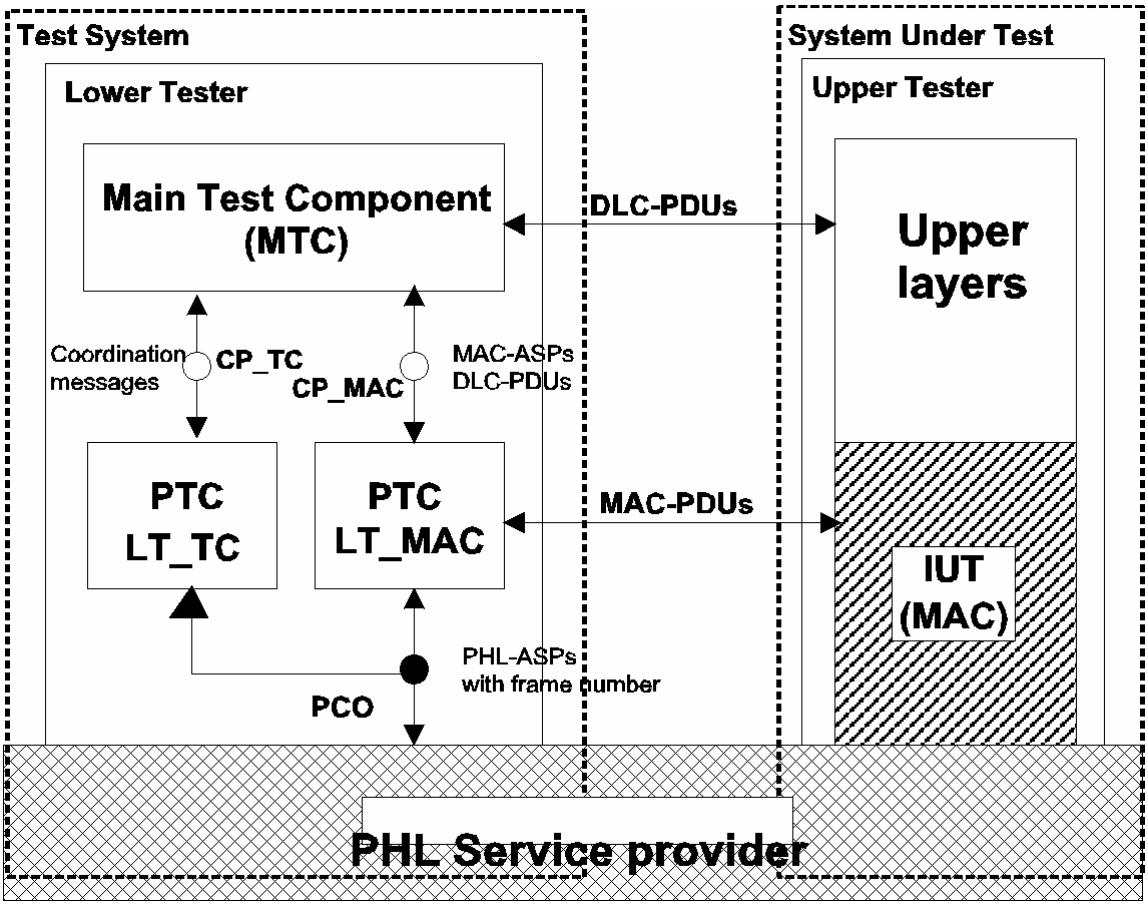

Figure 6: ATM for MAC layer testing, remote test method, embedded variant

A single-party testing context is used, which consists of the following abstract testing functions:

PCO: The PCO for MAC Layer testing is located at the D-SAP between the MAC layer and the Physical layer. All test events at the PCO are specified in terms of PHL-ASPs (frame number parameter added).

CP_TC: Coordination Point Test Case (CP_TC) is located between the MTC and PTC LT_TC in the test system. It is used for passing coordination messages between these two testing functions.

CP_MAC: Coordination Point MAC (CP_MAC) is located between the MTC and PTC LT_MAC in the test system. It is equivalent to the PCO used for DLC layer testing (see clause 6.2.3.3). All coordination messages at this CP are specified in terms of MAC-ASPs and DLC-PDUs.

PTC LT_TC: The Lower Tester Parallel Test Component LT_TC (PTC LT_TC) is located in the test system. It makes restricted use of the PCO by only observing the test events in both directions. It assigns preliminary verdicts (the MTC assigns the final verdict).

NOTE: This restricted use of the PCO is a non-ISO/IEC 9646-2 [57] application of the PCO.

PTC LT_MAC: The Lower Tester Parallel Test Component LT_MAC (PTC LT_MAC) is located in the test system. It provides indirect control and observation of the IUT during test execution, via the underlying service-provider. It does not assign any verdicts.

MTC: The Main Test Component (MTC) is located in the test system. It is responsible for creating and terminating the PTCs, managing the coordination points CP_TC and CP_MAC, and computation of the final TC verdict.

Upper layers: No explicit Upper Tester (UT) exists in the test system. However, the SUT (upper layers) needs to carry out some UT functions to achieve some effects of test co-ordination procedures.

The primitives used at the PCO (physical SAP - DSAP) are defined according to EN 300 175-2 [6], clause 7 and associated clauses.

The co-ordination messages used at CP_MAC co-ordination point are abstract primitives including Protocol Data Units (PDUs) and frames. The abstract primitives (MAC ASPs) are defined according to EN 300 175-3 [7], clause 8 and associated clauses. Two abstract primitives for starting and stopping the synchronization between the main test component and the parallel test component LT_MAC are added for the needs of the tester. The PDUs (DLC C-plane PDUs) are defined according to EN 300 175-4 [8], clause 7 and associated clauses. The frames (DLC U-plane frames) are defined according to EN 300 175-4 [8], clause 12 and associated clauses.

This ATM requires the use of concurrent TTCN, which is specified in ISO/IEC 9646-3 [58]. The parallel test components PTC_TC and PTC_MAC are, however, seen as two independent entities. This means that there is no communication or synchronization between the two PTCs during the test.

PTC_TC is specified in TTCN. Since PTC_TC is only observing at the PCO, this ATS does not contain any send statements. Once the TP is fulfilled, the PTC_TC terminates, i.e. there are no post ambles, unless required by the TP. No explicit coordination messages are exchanged at CP_TC. To simplify the TTCN TCs, the underlying service provider has been assigned the task of frame numbering. Consequently, a frame parameter has been added to some of the PHL-ASPs.

The requirements for PTC_MAC are specified using the GAP Profile ICS EN 300 474 [19].

The Main Test Component (MTC) creates the two PTCs (using CREATE operation), stimulates the PTC_MAC (using MAC ASPs at CP_MAC) and then waits for the two PTCs to terminate (using the DONE event). The final verdict is computed as follows:

a) A PASS is assigned if PTC_TC returns a PASS verdict and the expected event is received from PTC_MAC at CP_MAC;

b) A FAIL verdict is assigned if PTC_TC returns a FAIL verdict independently of what is received from PTC_MAC at CP_MAC;

c) An INCONC verdict is assigned if:

- PTC_TC returns an INCONC verdict and the expected event is received from PTC_MAC at CP_MAC; or

- PTC_TC returns a PASS verdict and an unexpected event is received from PTC_MAC at CP_MAC.

6.4.3.3.1.2 Data Link Control (DLC) layer testing

For testing the DLC layer protocol the embedded variant of Remote Single layer test method (RSE) is applied. The RSE test method has been selected, because:

- This test method implies no specific requirements from the IUT;

- The Upper Service Access Point (U-SAP) 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 realization 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.

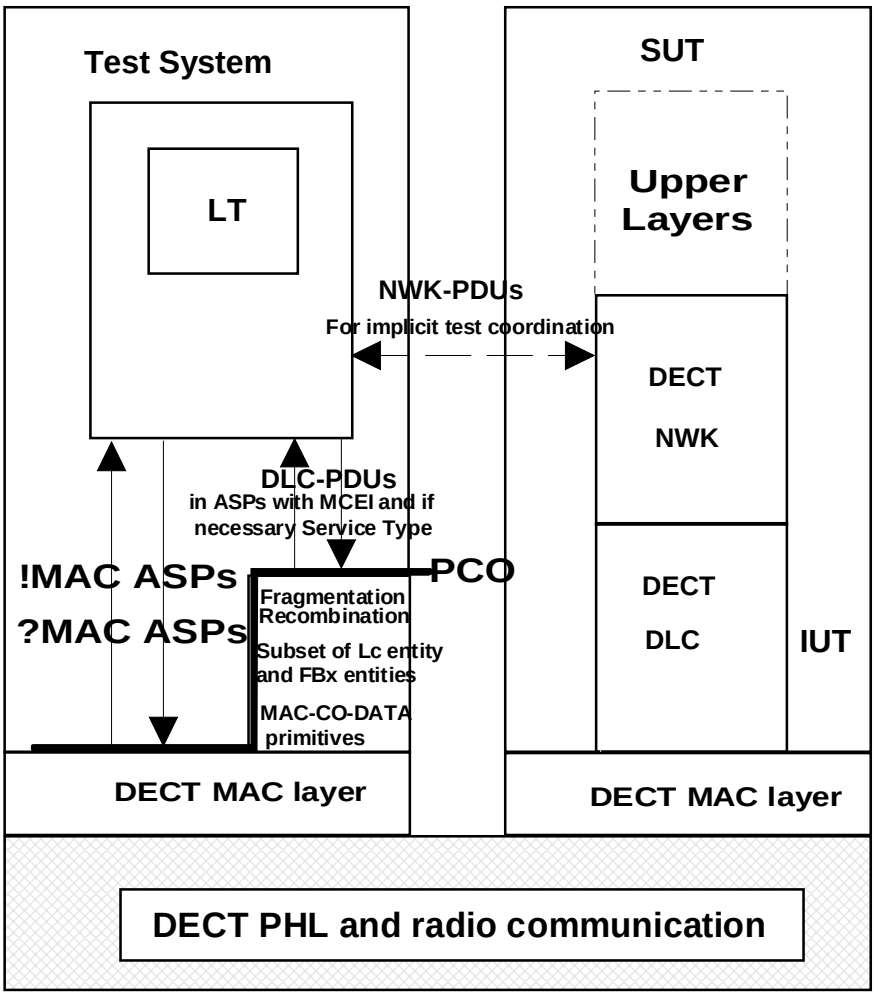

Figure 7: ATM for DLC layer testing, remote single layer test method embedded variant

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 these 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 SUT. Nevertheless, some network messages are sent to the SUT for the need of the co-ordination procedures. The NWK layer of the SUT is used as a notional UT as defined in ISO/IEC 9646 [56] to [62].

The MSAP primitives are defined according to EN 300 175-3 [7], clause 8 and associated clauses.

6.4.3.3.1.3 Network (NWK) layer testing

For testing the NWK layer protocol the embedded variant of Remote SinglE layer test method (RSE) is applied. The RSE test method has been selected, because:

- This test method implies no specific requirements from the IUT;
- The U-SAP 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 realization of conformance testing.

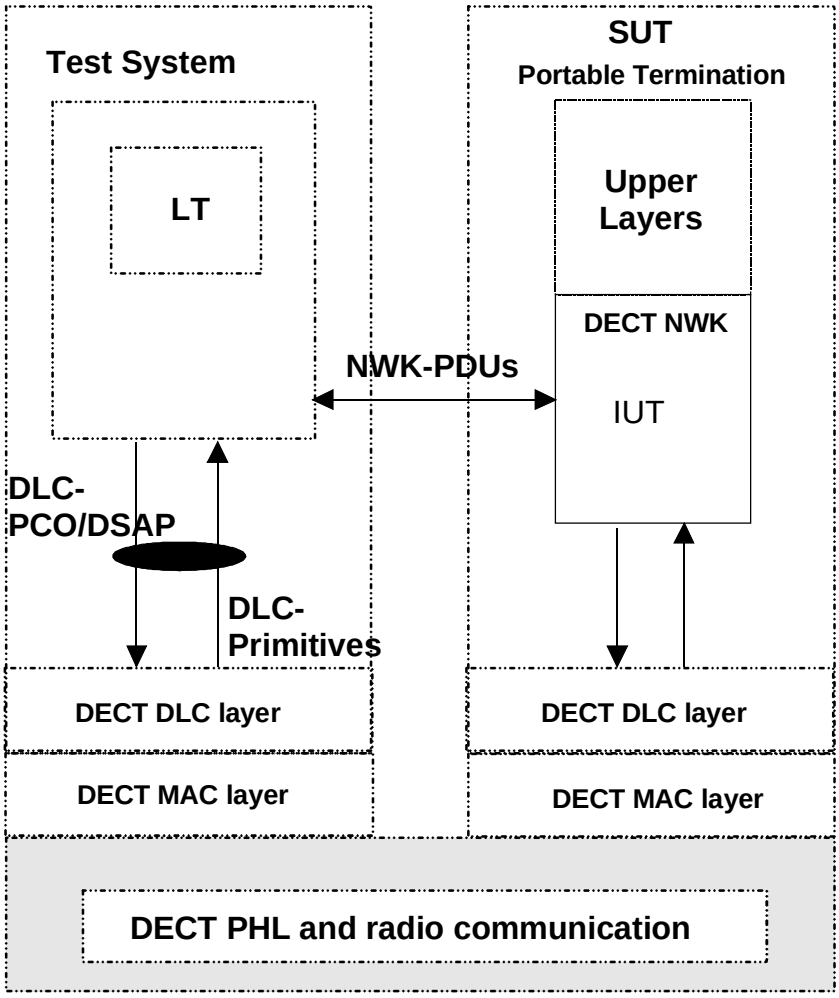

Figure 8: Remote single layer test method embedded variant

LT1: A Lower Tester (LT1) is located in a remote DECT test system. It controls and observes the behaviour of the IUT.

DSAP: A unique DLC SAP is defined at the DECT interface and used to exchange service data of the NWK layer protocol.

PCO: The PCO for NWK layer testing is located on the DSAP. All test events at the PCO are specified in terms of DLC ASPs and NWK layer PDUs.

Upper layers/tester No explicit Upper Tester (UT) exists in the test system. However, the SUT needs to carry out some UL functions to achieve some effects of test co-ordination procedures. Designing ATS, the capability of the IWU, such as PSTN, ISDN or GSM IWUs might be taken in account. The invocation An example of such controls could be to provoke restarting of the IUT through the Q interface.

The DSAP primitives are defined according to EN 300 175-4 [8], clause 8.3.2 (SSAP primitives) and clause 8.3.3 (B-SAP primitives).

6.4.3.3.2 DECT GAP profile test specification

The objective of the EN 300 494 [21] test specifications is to provide tests for DECT 3,1 kHz speech applications based on EN 300 444 [17]. This test specification is a Profile Test Specification (PTS) which is based on the TCL and follows the rules defined in ISO/IEC 9646-6 [61].

6.4.3.3.3 DECT DPRS profile test specification

The objective of the EN 301 469 [32] test specifications is to provide a basis for protocol conformance tests for DECT equipment giving a high probability of air interface inter-operability between different manufacturer's DECT equipment. The test specification is based on EN 301 649 [34]. As this test specification will provide the base for all other DECT DATA test specifications, it is also called Test Case Library (TCL).

6.4.3.3.4 DECT DMAP profile test specification

The objective of this TS 101 859 [36] test specification is to provide tests for equipment build on EN 301 650 [35]. This test specification is a PTS which is based on the DECT DATA TCL EN 301 469 (all parts) [32] and DECT GAP PTS EN 300 494 [21], and it follows the rules defined in ISO/IEC 9646-6 [61]. The test specification will be applied in addition to the DECT GAP PTS EN 300 494 [21].

6.4.3.3.5 DECT ISDN End System profile test specification

The objective of this ETS 300 758 [52] test specification is to provide tests for equipment build on EN 300 434 (all parts) [16]. The tests shall assure the inter-working of a DECT-ISDN equipment with a public ISDN network. This test specification is a PTS, which is based on the TCL, and DECT GAP PTS EN 300 494 [21], and it follows the rules defined in ISO/IEC 9646-6 [61]. The test specification will be applied in addition to the DECT GAP PTS EN 300 494 [21].

6.4.3.3.6 DECT ISDN Intermediate System profile test specification

The objective of this EN 301 614 [23] test specification is to provide tests for equipment build on EN 300 822 [25]. This test specification is a PTS, which is based on the TCL, and DECT GAP PTS EN 300 494 [21], and it follows the rules defined in ISO/IEC 9646-6 [61]. The test specification will be applied in addition to the DECT GAP PTS EN 300 494 [21].

6.4.3.3.7 DECT-GSM profile test specification

The objective of this test specification is to provide tests for equipment build to EN 300 370 [15]. The tests ensure the inter-working of a DECT/GSM PP with DECT FP attached to GSM Public Land Mobile Networks (PLMNs). This test specification is a PTS, which is based on the TCL, and DECT GAP PTS EN 300 494 [21], and it follows the rules defined in ISO/IEC 9646-6 [61]. The test specification will be applied in addition to the DECT GAP PTS EN 300 494 [21].

6.4.3.4.8 DECT-DAM test specification

The objective of the ETS 300 759 [53] test specification is to provide tests for the DAM in ETS 300 331 [48] and ETS 300 825 [55], which may be used in various DECT applications. The test specification will be applied in addition to the DECT GAP PTS EN 300 494 [21] and the relevant DECT application test specification (e.g. DECT-ISDN).

6.4.4 DECT test strategy

6.4.4.1 DECT abstract test methods

It is a major requirement of all DECT test methods not to make any assumptions on the internal functions of the IUT. None of the ETSI DECT protocol test specifications requires access to any of the internal interfaces between the OSI layers.

6.4.4.2 The use of implicit events

All test events, which cannot be invoked from the DECT air interface, events, which have to be invoked in the PP (e.g. by keyboard operations) or by the network simulator on the network interface of the FP, are defined as implicit events. This is a standardized ISO/IEC 9646-3 [58] conformant way, which gives freedom to the DECT equipment manufactures what concerns the invocation of such events.

6.4.4.3 The use of DECT test messages

DECT test messages are only used for physical layer testing in EN 300 176-1 [13] and EN 300 176-2 [14]. To avoid any additional test specific requirements on DECT equipment, for the purpose of protocol testing on any layers above the PHL layer, no DECT test messages are use.

6.5 DECT Interoperability Test Specification

In Conformance Testing, the tested equipment is working against test tool equipment. It is the test tool equipment that determines the conformity of the tested equipment with the tested behaviour. In Interoperability testing, two (or more) equipments are working one against the other(s). In Interoperability testing monitor equipment, tracing equipment and measurement equipment are used to determine the conformity of the two (or more) tested equipments with the tested behaviour.

6.5.1 DECT DPRS Interoperability Test Specification

The objective of the TS 101 950 [43] interoperability test specification is to provide tests for equipment build on EN 301 649 [34]. This test specification follows the rules defined in the ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [56] and ISO/IEC 9646-2 [57]) as well as the ETSI rules for conformance testing (ETS 300 406 [49]).

6.5.2 DECT ASAP Ethernet Interworking Interoperability Test Specification

The objective of the TS 102 014 [47] interoperability test specification is to provide tests for equipment build on TS 101 942 [39]. This test specification is a PTS, which is based on the TS 101 950 [43]. This test specification follows the rules defined in the ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [56] and ISO/IEC 9646-2 [57]) as well as the ETSI rules for conformance testing (ETS 300 406 [49]).

6.5.3 DECT ASAP V.24 Interworking Interoperability Test Specification

The objective of the TS 102 012 [45] interoperability test specification is to provide tests for equipment build on TS 101 947 [42]. This test specification is a PTS, which is based on the TS 101 950 [43]. This test specification follows the rules defined in the ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [56] and ISO/IEC 9646-2 [57]) as well as the ETSI rules for conformance testing (ETS 300 406 [49]).

6.6 DECT harmonized standard

Historically, the harmonized standard was defined for covering the old terminal Directive 98/13/EC [3] in preparation of the regulation process. Due to the new Terminal Directive 99/5/EC (R&TTE Directive [1]) that removes the regime of type approvals, the harmonized standards are actually useful for manufacturer self tests of conformity.

6.6.1 DECT ISDN IWP harmonized standard

The DECT/ISDN IWP consists of two separate standards, the "end system configuration" and the "intermediate system configuration". The end system configuration describes how ISDN services are offered via a DECT radio interface, when the ISDN is terminated in the DECT FP. The intermediate system configuration describes how ISDN is provided over DECT radio-interface, with a regenerated ISDN "S" interface in the DECT PP.

The objective of the EN 301 440 [31] is to provide the attachment requirements for terminal equipment for DECT/ISDN interworking profile applications that are specified in EN 300 434 [16] and EN 300 822 [25].

6.6.2 DECT/GSM dual mode terminals harmonized standard

The DECT/GSM integration based on dual-mode terminals document EN 301 242 [28] specifies the additional technical characteristics to be provided by terminal equipment which is capable of connection with a DECT radio access to a public telecommunications network as well as with GSM radio access to GSM Public Land Mobile Networks (PLMN).

The objective of the EN 301 439 [30] is to provide the attachment requirements for terminal equipment for DECT/GSM Dual Mode Terminals applications that are specified in EN 301 242 [28] standard.

6.7 DECT Protocol Implementations Conformance Statements (PICS)

6.7.1 Scope

The PICS proforma is a list of essential protocol requirements, which is defined in a tabular form of a questionnaire. A question is provided for each optional, and for each mandatory DECT protocol requirement.

The PICS provide an overview of the DECT capabilities and allow a static check of the inter working capabilities as well as of the static protocol conformance.

6.7.2 PICS standard

6.7.2.1 Structure

Table 3 shows the general structure of an ICS standard. The table shows the components of the standard in addition to the common ETSI standards layout.

Table 3: Structure of a PICS standard

Document type	Components associated with the document type
PICS proforma	- Identification of the Implementation - Identification of the protocol - Global statement of conformance - List of capabilities

6.7.2.2 Identification of the implementation

This clause provides a proforma for the identification of the implementation and its supplier.

6.7.2.3 Identification of the protocol

This clause provides a proforma for the identification of the protocol specification to which the ICS proforma applies.

6.7.2.4 Global statement of conformance

This clause requests from the implementation supplier a statement whether all mandatory capabilities of the protocol specification are implemented.

6.7.2.5 List of capabilities

This clause provides a proforma for all optional and significant mandatory capabilities. Each capability has a specific item including an item identifier and its conformance status (mandatory, optional, conditional, etc.).

6.7.3 Profile ICS standard

6.7.3.1 Structure

Table 4 shows the general structure of an ICS standard. Table 4 shows the components of the standard in addition to the common ETSI standards layout.

Table 4: Structure of profile ICS standard

Document type	Components associated with the Document type
Profile ICS	- Requirement list
Profile specific ICS proforma	- Identification of the Implementation - Identification of the protocol profile - Global statement of conformance - List of capabilities

6.7.3.2 Requirement List (RL)

In the RL all items are listed which change their conformance status in the profile implementation regarding the base protocol specification.

6.7.3.3 Identification of the implementation

This clause provides a proforma for the identification of the implementation and its supplier.

6.7.3.4 Identification of the protocol profile

This clause provides a proforma for the identification of the profile protocol specification to which the ICS proforma applies.

6.7.3.5 Global statement of conformance

This clause requests from the implementation supplier a statement whether all mandatory capabilities of the profile protocol specification are implemented.

6.7.3.6 List of capabilities

This clause provides a proforma for all profile specific optional and significant mandatory capabilities. Each capability has a specific item including an item identifier and its conformance status (mandatory, optional, conditional, etc.).

6.7.4 DECT PICS and profile ICS

This clause gives an introduction to the various ETSI DECT PICS and profile ICS standards.

6.7.4.1 DECT CI PICS

The basic PICS for the DECT Common Interface are provided in the EN 300 476 (all parts) [20] documents. The PICS are based on EN 300 175, parts 1 [5] to 8 [12]. These PICS provide the base for all other DECT Profile ICS.

6.7.4.2 DECT GAP profile ICS

The ICS for the DECT Generic Access Profile (GAP) standard are provided in the EN 300 474 [19] documents. The ICS are based on EN 300 444 [17]. These ICSs are a profile of EN 300 476 [20]. The standard follows the rules defined in ISO/IEC 9646 part 6 [61] and 7 [62].

6.7.4.3 DECT DPRS profile ICS

The ICS for the DECT Packet Radio Service (DPRS) standard are provided in the TS 101 869 [37] documents. The ICS are based on EN 301 649 [34]. These ICSs are a profile of EN 300 476 [20]. The standard follows the rules defined in ISO/IEC 9646 part 6 [61] and 7 [62].

6.7.4.4 DECT ASAP Ethernet interworking profile ICS

The ICS for the DECT ASAP Ethernet Interworking standard are provided in the TS 102 013 [46] documents. The ICS are based on TS 101 942 [39]. These ICSs are a profile of TS 101 869 [37]. The standard follows the rules defined in ISO/IEC 9646 part 6 [61] and 7 [62].

6.7.4.5 DECT ASAP V.24 interworking profile ICS

The ICS for the DECT ASAP V.24 Interworking standard are provided in TS 102 011 [44]. The ICS are based on TS 101 947 [42]. These ICSs are a profile of TS 101 869 [37]. The standard follows the rules defined in ISO/IEC 9646 part 6 [61] and 7 [62].

6.7.4.6 DECT ASAP DMAP profile ICS

The ICS for the DECT ASAP DMAP standard are provided in the TS 101 871 (all parts) [38] documents. The ICS are based on EN 301 650 [35]. These ICSs are a profile of TS 101 869 [37]. The standard follows the rules defined in ISO/IEC 9646 part 6 [61] and 7 [62].

6.7.4.7 DECT DATA service type D, class 2 profile ICS

The ICS for the DECT DATA Service type D, class 2 standard are provided in the TS 101 945 (all parts) [40] documents. The ICS are based on EN 301 238 [26]. These ICSs are a profile of TS 101 869 [37]. The standard follows the rules defined in ISO/IEC 9646 part 6 [61] and 7 [62].

6.7.4.8 DECT DATA service type E, class 2 profile ICS

The ICS for the DECT DATA Service type E, class 2 standard are provided in the TS 101 946 (all parts) [41] documents. The ICS are based on EN 300 757 [24]. These ICSs are a profile of TS 101 869 [37]. The standard follows the rules defined in ISO/IEC 9646 part 6 [61] and 7 [62].

6.7.4.9 DECT ISDN End System profile ICS

The ICS for the DECT ISDN End System standard are provided in ETS 300 705 [51]. The ICS are based on EN 300 434 [16]. These ICSs are a profile of EN 300 476 [20] and EN 300 474 [19], and it is applied together with these standards. The standard follows the rules defined in ISO/IEC 9646 part 6 [61] and 7 [62].

6.7.4.10 DECT ISDN Intermediate System profile ICS

The ICS for the DECT ISDN Intermediate System standard are provided in EN 301 241 [27]. The ICS are based on EN 300 822 [25]. These ICSs are a profile of EN 300 476 [20] and EN 300 474 [19], and it is applied together with these standards. The standard follows the rules defined in ISO/IEC 9646 part 6 [61] and 7 [62].

6.7.4.11 DECT-GSM profile ICS

The ICS for the DECT-GSM standard are provided in ETS 300 704 [50]. The ICS are based on EN 300 370 [15] and EN 300 466 [18]. These ICSs are a profile of EN 300 476 [20] and EN 300 474 [19], and it is applied together with these standards. The standard follows the rules defined in ISO/IEC 9646 part 6 [61] and 7 [62].

6.7.4.12 DECT-DAM PICS

The PICS for the DECT-DAM standard is provided in ETS 300 760 [54]. The PICS is based on ETS 300 331 [48] and ETS 300 825 [55].

6.7.5 Use of DECT PICS and profile ICS

A test laboratory will request the equipment manufacturer to fill in the PICS for the equipment to be tested. If the equipment is to be tested against a specific profile (e.g. GAP), the equipment has not only to fulfil at least the mandatory requirements of the PICS, it has also to fulfil the requirements of the RL which is a part of the profile specific ICS. In addition, the Profile specific ICS proforma has to be filled in. This procedure is shown in figure 9, which shows this procedure applied in the case of a GAP equipment.

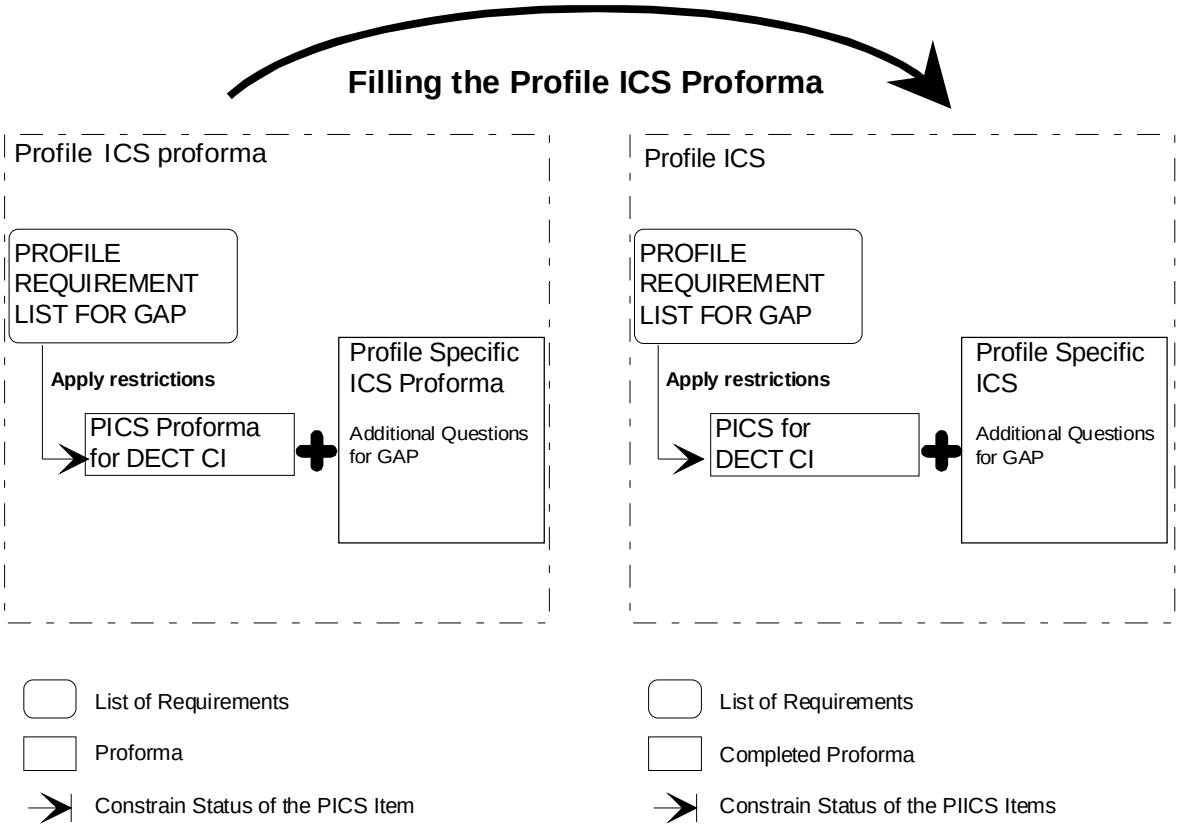

Figure 9: Example of DECT GAP profile ICS

Annex A (informative): Bibliography

ETSI EN 300 700: "Digital Enhanced Cordless Telecommunications (DECT); Wireless Relay Station (WRS)".

ETSI EN 300 824: "Digital Enhanced Cordless Telecommunications (DECT); Cordless Terminal Mobility (CTM); CTM Access Profile (CAP)".

ETSI EN 301 371 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Cordless Terminal Mobility (CTM); CTM Access Profile (CAP); Profile Test Specification (PTS)".

ETSI TS 101 808 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Wireless Relay Station (WRS); Test Case Library (TCL)".

ETSI TS 101 808 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Wireless Relay Station (WRS); Test Case Library (TCL)".

ETSI ETS 300 702 (all parts): "Digital Enhanced Cordless Telecommunications (DECT); Global System for Mobile communications (GSM); DECT/GSM Interworking Profile (IWP); Profile Test Specification (PTS)".

ITU-T Recommendation G.726: "40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM)".

History

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