



**Digital Enhanced Cordless Telecommunications (DECT);
Ultra Low Energy (ULE);
Machine to Machine Communications;
Part 2: Home Automation Network (phase 2)**

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Digital Enhanced Cordless Telecommunications (DECT).

The present document is based on ETSI EN 300 175 parts 1 [1] to 8 [8], ETSI EN 300 444 [9], ETSI EN 301 649 [16] and ETSI TS 102 939-1 [12].

The present document has been developed in accordance to the rules of documenting a profile specification as described in ISO/IEC 9646-6 [i.1].

The present document is part 2 of a multi-part deliverable covering Machine to Machine Communications based on DECT Ultra Low Energy (ULE), as identified below:

Part 1: "Home Automation Network (phase 1)";

Part 2: "Home Automation Network (phase 2)".

Further phases with additional functionality may be defined in the future by other parts of this multi-part deliverable.

Modal verbs terminology

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Introduction

DECT Ultra Low Energy (ULE) is based on the DECT base standard ETSI EN 300 175 parts 1 [1] to 8 [8], and the DECT Packet Radio Service (DPRS) ETSI EN 301 649 [16]. However, DECT ULE includes substantial differences from its parent technology in order to achieve Ultra Low Power consumption.

From the point of view of DECT standardization DECT ULE is an Application Profile (AP) based on the DECT base standard (ETSI EN 300 175, parts 1 [1] to 8 [8]). This application profile may reuse definitions and procedures defined in other DECT applications profiles when needed or convenient. This is the case, for instance, of the DECT Generic Access Profile (GAP) ETSI EN 300 444 [9], the DECT Packet Radio Service (DPRS) ETSI EN 301 649 [16] and DECT Ultra Low Energy (ULE) Part 1 [12].

All DECT devices claiming to be compliant with this Application Profile will offer at least the basic services defined as mandatory. In addition to that, optional features can be implemented to offer additional DECT ULE services.

The aim of the DECT ULE standard is to guarantee a sufficient level of interoperability and to provide an easy route for development of DECT ULE applications. The DECT ULE standard also guarantees compatibility between DECT ULE applications and existing DECT applications (such as GAP or NG-DECT) running over the same spectrum and even in the same device.

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1 Scope

The present document covers the following DECT ULE services and features:

- Back-compatibility with ULE Phase 1 [12].
- Regional variants of ULE for US and Japan.
- Support for hybrid devices which utilize ULE and non-ULE services (such as voice).
- Software Update Over The Air (SUOTA), compatible with the same feature as defined in New Generation DECT Part 4 [13].
- Compatibility mode for FTs that also support No-Emissions Mode (NEMo [13]).
- Connectionless Downlink, which is the capability to transmit ULE messages to multiple devices.
- Repeater compatibility support for FP and PP.

The set of DECT ULE services and features defined in the present document is named "Home Automation Network (phase 2)", and is primarily targeted to provide a global M2M solution within domestic scenarios. However, this does not prevent the use of the present document in other scenarios.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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

The following referenced documents are necessary for the application of the present document.

- [1] ETSI EN 300 175-1: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 1: Overview".
- [2] ETSI EN 300 175-2: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 2: Physical layer (PHL)".
- [3] ETSI EN 300 175-3: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 3: Medium Access Control (MAC) layer".
- [4] ETSI EN 300 175-4: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 4: Data Link Control (DLC) layer".
- [5] ETSI EN 300 175-5: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 5: Network (NWK) layer".
- [6] ETSI EN 300 175-6: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 6: Identities and addressing".
- [7] ETSI EN 300 175-7: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 7: Security features".

- [8] ETSI EN 300 175-8: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 8: Speech and audio coding and transmission".
- [9] ETSI EN 300 444: "Digital Enhanced Cordless Telecommunications (DECT); Generic Access Profile (GAP)".
- [10] ETSI TS 102 527-3: "Digital Enhanced Cordless Telecommunications (DECT); New Generation DECT; Part 3: Extended Wideband Speech Services".
- [11] ETSI TS 102 527-1: "Digital Enhanced Cordless Telecommunications (DECT); New Generation DECT; Part 1: Wideband speech".
- [12] ETSI TS 102 939-1 (V1.1.1): "Digital Enhanced Cordless Telecommunications (DECT); Ultra Low Energy (ULE); Machine to Machine Communications; Part 1: Home Automation Network (phase 1)".
- [13] ETSI TS 102 527-4: "Digital Enhanced Cordless Telecommunications (DECT); New Generation DECT; Part 4: Light Data Services; Software Update Over The Air (SUOTA), content downloading and HTTP based applications".
- [14] ETSI TS 102 497: "Digital Enhanced Cordless Telecommunications (DECT); DECT in the 1 920 MHz to 1 930 MHz Unlicensed Personal Communications Services (UPCS) frequency band; Specific requirements".
- [15] ARIB STD-T101: "Radio Equipment Used For TDMA Digital Enhanced Cordless Telecommunications".
- [16] ETSI EN 301 649: "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS)".
- [17] ETSI EN 300 700: "Digital Enhanced Cordless Telecommunications (DECT); Wireless Relay Station (WRS)".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ISO/IEC 9646-6: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 6: Protocol profile test specification".
- [i.2] Recommendation ITU-T G.726 (12/1990): "40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM)".
- [i.3] Recommendation ITU-T G.711 (11/1988): "Pulse code modulation (PCM) of voice frequencies".
- [i.4] Recommendation ITU-T G.722 (11/1988): "7 kHz audio-coding within 64 kbit/s".
- [i.5] Recommendation ITU-T G.729.1 (05/2006): "G.729 based embedded variable bit-rate coder: An 8-32 kbit/s scalable wideband coder bitstream interoperable with G.729".
- [i.6] ISO/IEC JTC1/SC29/WG11 (MPEG): International Standard ISO/IEC 14496-3:2009: "Information Technology - Coding of audio-visual objects - Part 3: Audio".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI TS 102 939-1 [12], ETSI TS 102 527-1 [11], ETSI TS 102 527-4 [13] and the following apply:

circuit mode: DECT connections involving setup of the MAC connection using Basic Connection control or Advanced Connection control, but not the "expedited" setup messages

NOTE: Such connections generally last of the order of several seconds (or several minutes for voice calls).

hybrid device: ULE device supporting voice and/or non-ULE data service

Last Minute Scan (LMS): RSSI scan which is generally performed at the last opportunity before transmission (e.g. in the frame before transmission)

Least Interfered Channel (LIC): slot/carrier pair which has the lowest level of interference, usually within a certain level of tolerance or range of values

NOTE: Calculation of the LIC generally requires a full matrix RSSI scan of all available slot/carrier combinations.

packet mode: DECT connections involving setup of the MAC connection using the Advanced Connection control "expedited" messages

NOTE: Such connections generally last of the order of a few frames only.

Personal Handy-phone System (PHS): cordless network telephony system operating in the 1 880 - 1 930 MHz frequency band

NOTE: PHS is used mainly in Japan, China, Taiwan, and some other Asian countries and regions.

3.2 Symbols

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

BA (bits)	B-field identification bits, the bits from the A-field header that provide indication for the content of the B-field of one MAC layer packet
BCK	bit used for I_p channel flow control in MAC I_p error correction services
B_S	slow Broadcast channel
B_U	ULE Broadcast channel
C	for conditional to support (process mandatory)
C	higher layer control Channel (see C_S and C_F)
C_F	higher layer signalling Channel (Fast)
C_S	higher layer signalling Channel (slow)
C-plane	Control plane
C_S	higher layer signalling Channel (Slow)
E+U	mode of the B-field E/U multiplexer carrying U-plane data and signalling
G_F	higher layer information control channel (fast) (a logical channel to the MAC layer)
G_{FA}	higher layer information control channel (slow) (a logical channel to the MAC layer)
I	for out-of-scope (provision optional, process optional) not subject for testing
I	higher layer Information channel (see I_N and I_P)
I_N	higher layer Information channel (unprotected)
I_P	higher layer Information channel protected (in general, any variant)
I_{PF}	higher layer Information channel (protected) transported multiplexed with signalling in the E+U type slots
I_{PM}	higher layer Information channel, multi-subfield (protected) B-field with error detection only