



# SLOVENSKI STANDARD

## SIST EN 300 175-2 V2.3.1:2010

01-oktober-2010

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**Digitalne izboljšane brezvrvične telekomunikacije (DECT) - Skupni vmesnik (CI) - 2.  
del: Fizična plast (PHL)**

Digital Enhanced Cordless Telecommunications (DECT) - Common Interface (CI) - Part  
2: Physical Layer (PHL)

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Ta slovenski standard je istoveten z: **EN 300 175-2 Version 2.3.1**

SIST EN 300 175-2 V2.3.1:2010  
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**ICS:**

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|-----------|--|---|
| 33.070.30 | Digitalne izboljšane brezvrvične telekomunikacije (DECT) | Digital Enhanced Cordless Telecommunications (DECT) |
|-----------|--|---|

|           |              |                |
|-----------|--------------|----------------|
| 35.100.10 | Fizični sloj | Physical layer |
|-----------|--------------|----------------|

|                                      |           |
|--------------------------------------|-----------|
| <b>SIST EN 300 175-2 V2.3.1:2010</b> | <b>en</b> |
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# ETSI EN 300 175-2 V2.3.1 (2010-06)

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*European Standard (Telecommunications series)*

## **Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 2: Physical Layer (PHL)**

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## Reference

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REN/DECT-000254-2

## Keywords

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DECT, IMT-2000, mobility, radio, TDD, TDMA**ETSI**

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## Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Digital Enhanced Cordless Telecommunications (DECT).

The present document is part 2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

Further details of the DECT system may be found in TR 101 178 [i.1] and ETR 043 [i.2].

| <b>National transposition dates</b>  |                   |
|--|-------------------|
| Date of adoption of this EN:   | 7 June 2010       |
| Date of latest announcement of this EN (doa):  | 30 September 2010 |
| Date of latest publication of new National Standard or endorsement of this EN (dop/e): | 31 March 2011     |
| Date of withdrawal of any conflicting National Standard (dow):                         | 31 March 2011     |

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# 1 Scope

The present document is one of the parts of the specification of the Digital Enhanced Cordless Telecommunications (DECT) Common Interface (CI).

This part of the DECT CI specifies the physical channel arrangements. DECT physical channels are radio communication paths between two radio end points. A radio end point is either part of the fixed infrastructure, a privately owned Fixed Part (FP), typically a base station, or a Portable Part (PP), typically a handset. The assignment of one or more particular physical channels to a call is the task of higher layers.

The Physical Layer (PHL) interfaces with the Medium Access Control (MAC) layer, and with the Lower Layer Management Entity (LLME). On the other side of the PHL is the radio transmission medium which has to be shared extensively with other DECT users and a wide variety of other radio services. The tasks of the PHL can be grouped into five categories:

- a) to modulate and demodulate radio carriers with a bit stream of a defined rate to create a radio frequency channel;
- b) to acquire and maintain bit and slot synchronization between transmitters and receivers;
- c) to transmit or receive a defined number of bits at a requested time and on a particular frequency;
- d) to add and remove the synchronization field and the Z-field used for rear end collision detection;
- e) to observe the radio environment to report signal strengths.

The present document includes New Generation DECT, a further development of the DECT standard introducing wideband speech, improved data services, new slot types and other technical enhancements.

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## 2 References

SIST EN 300 175-2 V2.3.1:2010

[https://standards.iteh.ai/catalog/standards/sist/8f734da2-bb35-4123-96a0-](https://standards.iteh.ai/catalog/standards/sist/8f734da2-bb35-4123-96a0-51b895413f/sist-en-300-175-2-v2.3.1-2010)

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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.

### 2.1 Normative references

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] Void.
- [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] Void.
- [8] Void.
- [9] ETSI EN 300 176-1: "Digital Enhanced Cordless Telecommunications (DECT); Test specification; Part 1: Radio".
- [10] ITU-R Recommendation M.1457-6: "Detailed specifications of the radio interfaces of International Mobile Telecommunications-2000 (IMT-2000)".
- [11] ITU-T Recommendation V.11: "Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s".
- [12] Federal Communications Commission FCC 02-151: "Second Report and Order, Amendment of Part 15 of the Commission's Rules Regarding Spread Spectrum Devices".
- [13] CEPT/ECC/DEC/(06)01: "ECC Decision of 24 March 2006 on the harmonized utilization of spectrum for terrestrial IMT-2000/UMTS systems operating within the bands 1900 - 1980 MHz, 2010 - 2025 MHz and 2110 - 2170 MHz".

## 2.2 Informative references

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] ETSI TR 101 178: "Digital Enhanced Cordless Telecommunications (DECT); A High Level Guide to the DECT Standardization".
- [i.2] ETSI ETR 043: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Services and facilities requirements specification".
- [i.3] International Commission on Non-Ionizing Radiation Protection (ICNIRP): "Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz), Health Physics", vol. 74, pp 494-522, April 1998.
- [i.4] Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (Official Journal of the European Communities, July 1999).
- [i.5] CENELEC EN 50360: "Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz - 3 GHz)", European Committee for Electrotechnical Standardization (CENELEC), July 2001. (Harmonized standard listed under the R&TTE directive).
- [i.6] CENELEC EN 50385: "Product standard to demonstrate the compliance of radio base stations and fixed terminal stations for wireless telecommunication systems with the basic restrictions or the reference levels related to human exposure to radio frequency electromagnetic fields (110 MHz - 40 GHz) - General public", European Committee for Electrotechnical Standardization (CENELEC), November 2001 (draft).
- [i.7] CENELEC EN 50383: "Basic standard for the calculation and measurement of electromagnetic field strength and SAR related to human exposure from radio base stations and fixed terminal stations for wireless telecommunication systems (110 MHz - 40 GHz)", European Committee for Electrotechnical Standardization (CENELEC), November 2001 (draft).
- [i.8] IEEE 802.11b: "Standard for Information Technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**antenna diversity:** See EN 300 175-1 [1].

**cell:** See EN 300 175-1 [1].

**Central Control Fixed Part (CCFP):** See EN 300 175-1 [1].

**channel:** See EN 300 175-1 [1].

**cluster:** See EN 300 175-1 [1].

**Connection Oriented mode (C/O):** See EN 300 175-1 [1].

**Cordless Radio Fixed Part (CRFP):** See EN 300 175-1 [1].

**coverage area:** See EN 300 175-1 [1].

**DECT Network (DNW):** See EN 300 175-1 [1].

**double duplex bearer:** See EN 300 175-1 [1].

**double simplex bearer:** See EN 300 175-1 [1].

**double slot:** See EN 300 175-1 [1].

**down-link:** See EN 300 175-1 [1].

**duplex bearer:** See EN 300 175-1 [1].

**Fixed Part (DECT Fixed Part) (FP):** See EN 300 175-1 [1].

**Fixed radio Termination (FT):** See EN 300 175-1 [1].

**frame:** See EN 300 175-1 [1].

**full slot (slot):** See EN 300 175-1 [1].

**guard space:** See EN 300 175-1 [1].

**half slot:** See EN 300 175-1 [1].

**handover:** See EN 300 175-1 [1].

**IMT-2000:** International Mobile Telecommunications, Third Generation Mobile Systems

**IMT-FT:** International Mobile Telecommunications, FDMA/TDMA

NOTE: This is the DECT family member of IMT-2000.

**intercell handover:** See EN 300 175-1 [1].

**intracell handover:** See EN 300 175-1 [1].

**Lower Layer Management Entity (LLME):** See EN 300 175-1 [1].

**multiframe:** See EN 300 175-1 [1].

**New Generation DECT:** See EN 300 175-1 [1].

**physical channel (channel):** See EN 300 175-1 [1].

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**Portable Part (DECT Portable Part) (PP):** See EN 300 175-1 [1].

**Portable radio Termination (PT):** See EN 300 175-1 [1].

**public access service:** See EN 300 175-1 [1].

**radio channel:** See EN 300 175-1 [1].

**radio end point:** See EN 300 175-1 [1].

**Radio Fixed Part (RFP):** See EN 300 175-1 [1].

**Repeater Part (REP):** See EN 300 175-1 [1].

**RF carrier (carrier):** See EN 300 175-1 [1].

**RF channel:** See EN 300 175-1 [1].

**simplex bearer:** See EN 300 175-1 [1].

**Single Radio Fixed Part (SRFP):** See EN 300 175-1 [1].

**TDMA frame:** See EN 300 175-1 [1].

**Wireless Relay Station (WRS):** See EN 300 175-1 [1].

## 3.2 Abbreviations

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

|        |   |
|--------|---|
| AM     | Amplitude Modulation  |
| BER    | Bit Error Rate  |
| CCFP   | Central Control Fixed Part                                    |
| CI     | Common Interface (standard)                                   |
| CRFP   | Cordless Radio Fixed Part                                     |
| CTA    | Cordless Terminal Adapter                                     |
| dBm    | dB relative to 1 milliwatt                                    |
| DBPSK  | Differential Binary Phase Shift Keying                        |
| DC     | Direct Current  |
| DLC    | Data Link Control layer                                       |
| DNW    | DECT Network  |
| DQPSK  | Differential Quaternary Phase Shift Keying                    |
| D-SAP  | Data field-Service Access Point                               |
| DSV    | Digital Sum Variation   |
| EIRP   | Equivalent Isotropically Radiated Power                       |
| ERP    | Effective Radiated Power                                      |
| EVM    | Error-Vector Magnitude  |
| FMID   | Fixed part MAC IDentity                                       |
| FP     | Fixed Part  |
| FT     | Fixed radio Termination                                       |
| Fy     | Frequency   |
| GFSK   | Gaussian Frequency Shift Keying                               |
| GMSK   | Gaussian Minimum Shift Keying                                 |
| GPS    | Global Positioning System                                     |
| ICNIRP | International Commission on Non-Ionizing Radiation Protection |
| iDCS   | instant Dynamic Channel Selection                             |
| IMT-FT | International Mobile Telecommunications - Frequency Time      |
| ISM    | Industrial, Scientific and Medical                            |
| LLME   | Lower Layer Management Entity                                 |
| MAC    | Medium Access Control layer                                   |
| MCM    | Minimum Common Multiple                                       |
| MFN    | MultiFrame Number   |
| NTP    | Normal Transmitted Power                                      |
| NWK    | NetWork   |

|        |   |
|--------|---|
| PCMCIA | Personal Computer Memory Card International Association |
| PHL    | PHysical Layer  |
| PM-SAP | Physical layer Management entity - Service Access Point |
| PP     | Portable Part   |
| ppm    | parts per million                                       |
| PSCN   | Primary receiver Scan Carrier Number                    |
| PT     | Portable radio Termination                              |
| REP    | REpeater Part   |
| RF     | Radio Frequency   |
| RFP    | Radio Fixed Part  |
| RMS    | Root Mean Square  |
| RPN    | Radio fixed Part Number                                 |
| RSSp   | Radio Signal Strength PP                                |
| SAP    | Service Access Point                                    |
| SAR    | Specific Absorption Rate                                |
| SDU    | Service Data Unit                                       |
| SRFP   | Single Radio Fixed Part                                 |
| TDD    | Time Division Duplex                                    |
| TDMA   | Time Division Multiple Access                           |
| UMTS   | Universal Mobile Telecommunication System               |
| UTC    | Universal Time Coordinated                              |
| WLAN   | Wireless Local Area Network                             |
| WRS    | Wireless Relay Station                                  |

## 4 PHL services

A physical channel provides a simplex bit-pipe between two radio end points. To establish, for example, a duplex telephone connection, two physical channels have to be established between the endpoints.

Radio spectrum is needed to create a physical channel. The radio spectrum space has three dimensions:

- geometric (geographic) space;
- frequency;
- time.

Spectrum is assigned to physical channels by sharing it in these three dimensions.

DECT provides a mechanism called "handover" to release a physical channel and to establish another one in any or all of the three dimensions without releasing the end-to-end connection.

The requirements of the present document should be read in conjunction with EN 300 176-1 [9].

The requirements specified apply for nominal conditions unless extreme conditions are stated. Tests at extreme conditions may include combinations of limit values of extreme temperature and of power supply variation, defined for each case in EN 300 176-1 [9].

Nominal and extreme temperature ranges are defined below:

|                      |                         |                   |
|----------------------|-------------------------|-------------------|
| Nominal temperature: | PP, FP, RFP, CCFP       | +15 °C to +35 °C; |
| Extreme temperature: | PP                      | 0 °C to +40 °C;   |
|                      | FP, RFP, CCFP, class E1 | +10 °C to +40 °C; |
|                      | FP, RFP, CCFP, class E2 | -10 °C to +55 °C. |

The environmental class E1 refers to installation in indoor heated and/or cooled areas allowing for personal comfort, e.g. homes, offices, laboratories or workshops. The environmental class E2 refers to all other installations.

For nominal temperature, each measurement is made at the temperature of the test site, which shall be within +15 °C to +35 °C. For extreme temperatures, additional measurements are made, at each limit value of the extreme temperature.

## 4.1 RF channels (access in frequency)

### 4.1.1 Nominal position of RF carriers

DECT carriers are specified for the whole frequency range 1 880 MHz to 1 980 MHz and 2 010 MHz to 2 025 MHz. Carrier positions in the 902 MHz to 928 MHz ISM band and the 2 400 MHz to 2 483,5 MHz ISM band have been defined for the US market [12].

DECT is also an IMT-2000 [10] family member, called IMT-FT, the only member that provides for uncoordinated installations on an unlicensed spectrum. RF carriers for IMT-FT applications of DECT are placed within the parts of the European UMTS spectrum applicable for TDD operation. (See ECC/DEC/(06)01 [13].) E.g. within 1 900 MHz to 1 920 MHz, 1 920 MHz to 1 980 MHz and/or 2 010 MHz to 2 025 MHz.

The most common spectrum allocation is 1 880 MHz to 1 900 MHz, but outside Europe spectrum is also available in 1 900 MHz to 1 920 MHz and in 1 910 MHz to 1 930 MHz (several countries).

Ten RF carriers are defined in the frequency band 1 880 MHz to 1 900 MHz with centre frequencies  $F_c$  given by:

$$F_c = F_0 - c \times 1,728 \text{ MHz};$$

where:  $F_0 = 1\,897,344 \text{ MHz}$ ; and

$$c = 0, 1, \dots, 9.$$

Above this band, additional carriers are defined in annex F. Annex F shows the carrier frequencies for  $c = 0$  to 9 and for  $c \geq 10$  and RF bands 00001 to 01001 (see EN 300 175-3 [3], clauses 7.2.3.3 and 7.2.3.9).

The frequency band between  $F_c - 1,728/2 \text{ MHz}$  and  $F_c + 1,728/2 \text{ MHz}$  shall be designated RF channel  $c$ .

NOTE: A nominal DECT RF carrier is one whose centre frequency is generated by the formula:  
 $F_g = F_0 - g \times 1,728 \text{ MHz}$ , where  $g$  is any integer.

All DECT equipment should when allowed be capable of working on all 10 RF channels,  $c = 0, 1, \dots, 9$ .

New or modified carrier positions and/or frequency bands can (locally) be defined when needed by utilizing reserved RF band numbers.

### 4.1.2 Accuracy and stability of RF carriers

At an RFP the transmitted RF carrier frequency corresponding to RF channel  $c$  shall be in the range  $F_c \pm 50 \text{ kHz}$  at extreme conditions.

At a PP the centre frequency accuracy shall be within  $\pm 50 \text{ kHz}$  at extreme conditions either relative to an absolute frequency reference or relative to the received carrier, except that during the first 1 s after the transition from the idle-locked state to the active-locked state the centre frequency accuracy shall be within  $\pm 100 \text{ kHz}$  at extreme conditions relative to the received carrier.

NOTE: The above state transition is defined in EN 300 175-3 [3].

The maximum rate of change of the centre frequency at both the RFP and the PP while transmitting, shall not exceed 15 kHz per slot.