

ETSI EN 301 406-2 V3.1.1 (2023-08)



Digital Enhanced Cordless Telecommunications (DECT); Harmonised Standard for access to radio spectrum; Part 2: DECT-2020 NR

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Foreword

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

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.1] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.2].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in Table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive and associated EFTA regulations.

The present document is part 2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.15].

The present document covers DECT-2020 NR (New Radio) as defined by the multi-part technical specification ETSI TS 103 636 (see [i.12] for an overview).

| National transposition dates | |
|--|-----------------|
| Date of adoption of this EN: | 27 July 2023 |
| Date of latest announcement of this EN (doa): | 31 October 2023 |
| Date of latest publication of new National Standard or endorsement of this EN (dop/e): | 30 April 2024 |
| Date of withdrawal of any conflicting National Standard (dow): | 30 April 2025 |

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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1 Scope

The present document specifies technical characteristics and methods of measurements for equipment employing DECT-2020 NR (New Radio) as specified in by the multi-part technical specification ETSI TS 103 636, see [i.12] for an overview.

Table 1: Radiocommunications service frequency bands

| Radiocommunications service frequency bands | |
|---|------------------------|
| Transmit | 1 880 MHz to 1 900 MHz |
| Receive | 1 880 MHz to 1 900 MHz |

National regulation can allow additional frequency bands. The limits and test procedures included in the present document are applicable for DECT-2020 NR use in frequency ranges below 6 GHz.

NOTE: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.2] is given in annex A.

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.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference/>.

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 TS 103 636-4 \(V1.4.1\)](#): "DECT-2020 New Radio (NR); Part 4: MAC layer; Release 1".

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] [M/536 Commission implementing Decision C\(2015\) 5376](#) final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.
- [i.2] [Directive 2014/53/EU of the European Parliament](#) and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.
- [i.3] Void.

- [i.4] [ERC Recommendation 74-01](#): "Unwanted emissions in the spurious domain", Edition May 2019.
- [i.5] Void.
- [i.6] ETSI EG 203 367 (V1.1.1) (06-2016): "Guide to the application of harmonised standards covering articles 3.1b and 3.2 of the Directive 2014/53/EU (RED) to multi-radio and combined radio and non-radio equipment".
- [i.7] ETSI TR 100 028-1 (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1".
- [i.8] ETSI TR 100 028-2 (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2".
- [i.9] ETSI TR 102 273-2 (V1.2.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties; Part 2: Anechoic chamber".
- [i.10] ETSI TR 102 273-3 (V1.2.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties; Part 3: Anechoic chamber with a ground plane".
- [i.11] ETSI TR 102 273-4 (V1.2.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties; Part 4: Open area test site".
- [i.12] ETSI TS 103 636 (all parts): "DECT-2020 New Radio (NR)".
- [i.13] ETSI TS 103 636-2: "DECT-2020 New Radio (NR); Part 2: Radio reception and transmission requirements; Release 1".
- [i.14] ETSI TS 103 636-3: "DECT-2020 New Radio (NR); Part 3: Physical layer; Release 1".
- [i.15] ETSI EN 301 406-1: "Digital Enhanced Cordless Telecommunications (DECT); Harmonised Standard for access to radio spectrum; Part 1: DECT, DECT Evolution and DECT ULE".
- [i.16] ETSI EG 203 336: "Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

antenna assembly: combination of the antenna (integral or dedicated), its coaxial cable and if applicable, its antenna connector and associated switching components

NOTE 1: This term (antenna assembly) refers to an antenna connected to one transmit chain.

NOTE 2: The gain of an antenna assembly G in dBi, does not include the additional gain that may result out of beamforming techniques.

burst: one or multiple subslot(s) as defined in ETSI TS 103 636-3 [i.14], clause 4.4

channel plan: combination of the centre frequencies and for each of the centre frequencies, the declared nominal bandwidth(s)

dedicated antenna: antenna external to the equipment, using an antenna connector with a cable or a wave-guide and which has been designed or developed for one or more specific types of equipment

Fixed Termination (FT): operational mode of RD where RD initiates coordinates local radio resources, provides information how other RDs may connect and communicate with it

integral antenna: antenna designed as a fixed part of the equipment (without the use of an external connector) which cannot be disconnected from the equipment by a user with the intent to connect another antenna

NOTE: An integral antenna may be fitted internally or externally. In the case where the antenna is external, a non-detachable cable or wave-guide can be used.

nominal transmit power: mean transmitter output power at the antenna connector measured over the transmission bandwidth to deliver to a load with resistance equal to the nominal load impedance of the transmitter

operating channel: single continuous part of radio spectrum with a defined bandwidth where RDs transmit and/or receive

Portable Termination (PT): operational mode of RD where RD selects another RD, which is in FT mode, for association

Radio Device (RD): equipment with radio transmission and reception capability, which can operate in FT and/or PT mode

receive chain: receiver circuit with an associated antenna, which may be shared with a transmit chain

resource: variable length time unit defined in subslot(s) in single operating channel that RD is using for transmission or reception of physical layer packet

smart antenna systems: equipment that combines multiple transmit and/or receive chains with a signal processing function to increase the throughput and/or to optimize its radiation and/or reception capabilities

NOTE: These are techniques such as spatial multiplexing, beamforming, cyclic delay diversity, MIMO, etc.

transmission bandwidth: maximum bandwidth of active subcarriers of the transmitted signal

NOTE: As defined in ETSI TS 103 636-2 [i.13], clause 5.3.2.

transmit chain: transmitter circuit with an associated antenna, which may be shared with a receive chain

3.2 Symbols

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

| | |
|-----------------------|---|
| B | Nominal Channel Bandwidth |
| B_{occupied} | Occupied Channel Bandwidth |
| dB _i | dB(isotropic) - the forward gain of an antenna compared with the hypothetical isotropic antenna, which uniformly distributes energy in all directions |
| dBm | Absolute power level relative to 1 milliwatt, expressed in dB |
| f_c | Nominal Centre Frequency |
| $f_{c,a}$ | Actual Centre Frequency |
| f_n | Nominal Centre Frequencies of the operating channel with absolute channel number n as defined in ETSI TS 103 636-2 [i.13] |
| log() | logarithm to base 10 |

3.3 Abbreviations

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

| | |
|------|-------------------------------|
| ACK | Acknowledgement |
| ACS | Adjacent Channel Selectivity |
| AWGN | Additive White Gaussian Noise |
| BPSK | Binary Phase Shift Keying |
| BW | Bandwidth |
| CRC | Cyclic Redundancy Check |

| | |
|----------|--------------------------------------|
| CW | Continuous Wave |
| e.i.r.p. | effective isotropic radiated power |
| e.r.p. | effective radiated power |
| EFTA | European Free Trade Association |
| ER | Error Rate |
| EUT | Equipment Under Test |
| FAR | Fully Anechoic Room |
| FT | Fixed Termination |
| HARQ | Hybrid Automatic Repeat Request |
| LPDA | Logarithmic Periodic Dipole Antennas |
| NACK | Negative Acknowledgement |
| NF | Noise Figure |
| NR | New Radio |
| OATS | Open Area Test Site |
| OOB | Out Of Band |
| PER | Packet Error Rate |
| PT | Portable Termination |
| QPSK | Quadrature Phase-Shift Keying |
| RBW | Resolution Bandwidth |
| RD | Radio Device |
| RF | Radio Frequency |
| RMS | Root Mean Square |
| RSSI-1 | Radio Signal Strength Indicator 1 |
| SAR | Semi Anechoic Room |
| SNR | Signal to Noise Ratio |
| VBW | Video Bandwidth |
| VSWR | Voltage Standing Wave Ratio |

STANDARD PREVIEW

4 Technical requirements specifications

4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be in accordance with its intended use. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the operational environmental profile defined by its intended use.

4.2 General requirements

The equipment shall be designed, constructed and manufactured in accordance with good engineering practice and with the aim of minimizing harmful interference to other equipment and services.

The equipment supplied for testing shall be market conform.

Equipment submitted for testing shall support operation with at least one Nominal Channel Bandwidth B as defined in clause 4.3.3.

Equipment submitted for testing, where applicable, shall fulfil the requirements of the present document on all frequencies over which it is intended to operate.

NOTE: Equipment operating on multiple RF channels concurrently (e.g. multi-transceiver operation) is handled like multiple, co-located equipment, where each have to assess the RF channel and operate on it independently from each other.

4.3 Conformance requirements for transmitter

4.3.1 Transmitter RF Output Power

4.3.1.1 Definition

The *Transmitter RF Output Power* is the effective isotropic radiated power (e.i.r.p.) including any additional gain by antenna, additional (beamforming) gain in smart antenna systems (devices with multiple transmit chains), and/or supporting circuitry.

The maximum output power is measured as the mean power over a transmission burst. A transmission burst consists of one or multiple subslot(s) as defined in ETSI TS 103 636-3 [i.14], clause 4.4. The transmission signal bandwidth is the maximum bandwidth of active subcarriers of the transmitted signal as defined in ETSI TS 103 636-2 [i.13], clause 5.3.2.

4.3.1.2 Limit

The maximum allowed transmitter RF output power for equipment operating on a single *Nominal Channel Bandwidth* is up to:

- 26 dBm e.i.r.p. for use with omni-directional antennas;
- 30 dBm e.i.r.p. for use with directional antennas, with a maximum nominal transmit power of 24 dBm.

NOTE 1: National regulation can define a different maximum transmitter RF output power limit, which might be dependent on frequency range.

NOTE 2: Individual licensing might allow a higher maximum transmitter RF output power.

For equipment employing multiple transmit antennas, the total transmitter RF output power of the multi-antenna assembly is limited as a total by the maximum transmitter RF output power limit. The use of transmit beamforming is considered as directional antenna.

For equipment operating on multiple radio channels independently (e.g. multi-transceiver operation), the maximum transmitter RF output power limit applies to each of the radio channels independently.

4.3.1.3 Conformance

Conformance tests as defined in clause 5.4.1 shall be carried out.

4.3.2 Nominal Centre Frequencies

4.3.2.1 General

The equipment operates with a channel plan consisting of nominal channels with bandwidth B and nominal centre frequencies f_n .

4.3.2.2 Definitions

The *Nominal Centre Frequency* is the centre of the *Nominal Channel* with bandwidth B .

The *Measured Centre Frequency* is the centre of the *Operating Channel*.

The transmitter frequency error is determined by the difference between the *Nominal Centre Frequency* and the *Measured Centre Frequency* of the device.

4.3.2.3 Limit

In general, the Nominal Centre Frequencies f_n are given by equation:

$$f_n = f_{0,1} + n \times 0,864 \text{ MHz, below 3 GHz for } n = 1 \dots 2\,951$$

$$f_n = f_{0,2} + (n-2\,952) \times 1,728 \text{ MHz, above 3 GHz for } n = 2\,952 \dots 8\,192$$

where:

$$f_{0,1} = 450,144 \text{ MHz and } f_{0,2} = 3\,000,596 \text{ MHz}$$

Equipment operating in the frequency band 1 880 MHz to 1 900 MHz shall be capable of working on the channel number ranges listed in Table 2.

Equipment operating in the frequency band 1 880 MHz to 1 900 MHz and operating with a nominal channel bandwidth $B = 1,728$ MHz shall be restricted to the specific absolute channel numbers as given in Table 2.

NOTE: Equipment is allowed to support one or more nominal channel bandwidth(s) B .

Table 2: Applicable Channel Number Ranges for 1 880 MHz to 1 900 MHz

| Nominal channel Bandwidth B | Absolute channel number range | Operation restricted to the following specific absolute channel numbers |
|-------------------------------|-------------------------------|--|
| 1,728 MHz | 1 657 to 1 677 | 1 657, 1 659, 1 661, 1 663, 1 665, 1 667, 1 669, 1 671, 1 673, 1 675 and 1 677 |
| 3,456 MHz | 1 658 to 1 676 | 1 658, 1 660, 1 662, 1 664, 1 666, 1 668, 1 670, 1 672, 1 674, 1 676 |
| 6,912 MHz | 1 660 to 1 674 | 1 660, 1 662, 1 664, 1 666, 1 668, 1 670, 1 672, 1 674 |

The measured transmitter centre frequency shall be within ± 15 ppm of the Nominal Centre Frequency.

4.3.2.4 Conformance

Conformance tests as defined in clause 5.4.2 shall be carried out.

4.3.3 Nominal Channel Bandwidth

4.3.3.1 Definitions

The *Nominal Channel Bandwidth* B is the widest band of frequencies, including guard bands, assigned to a transmission signal.

4.3.3.2 Limit

In general, the Nominal Channel Bandwidth B shall be $1,728 \text{ MHz} \times 2^N$, where N is an integer value, e.g. 0, 1, 2, ..., N .

Table 3 provides examples.

Table 3: Examples of Nominal Channel Bandwidth B

| N | B |
|---|-----------|
| 0 | 1,728 MHz |
| 1 | 3,456 MHz |
| 2 | 6,912 MHz |

If the equipment supports multiple Nominal Channel Bandwidths B , the equipment may change it during the operation.

If the equipment supports multiple transmitter chains, each of transmitter chains shall meet this requirement.