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DECT-2020 New Radio (NR);
Part 2: Radio reception and transmission requirements;
Release 1

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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 part 2 of a multi-part deliverable specifying the DECT-2020 New Radio (NR) technology. Full details of the entire series can be found in part 1 [1].

DECT-2020 NR is recognized in Recommendation ITU-R M.2150 [i.2] as a component RIT fulfilling the IMT-2020 requirements of the IMT-2020 use scenarios Ultra Reliable Low Latency Communication (URLLC) and massive Machine Type Communication (mMTC). The Set of Radio Interface Technology (SRIT) called "DECT 5G SRIT" is involving 3GPP NR and DECT-2020 NR.

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 establishes the minimum RF requirements for DECT-2020 New Radio (NR) Radio Devices (RDs). For clarity these requirements cover both Fixed Termination point (FT) as well as Portable Termination point (PT).

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 103 636-1: "DECT-2020 New Radio (NR); Part 1: Overview; Release 1".

[2] ETSI TS 103 636-3: "DECT-2020 New Radio (NR); Part 3: Physical layer; Release 1".

[3] ETSI TS 103 636-4: "DECT-2020 New Radio (NR); Part 4: MAC layer; Release 1".

[4] Recommendation ITU-R M.1545: "Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000".

[5] Recommendation ITU-R SM.329: "Unwanted emissions in the spurious domain".

[6] IEC 60068-2-1: "Environmental testing - Part 2-1: Tests - Test A: Dry Cold".

[7] IEC 60068-2-2: "Environmental testing - Part 2-2: Tests - Test B: Dry heat".

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] ETSI TR 100 028-1 (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1".

[i.2] Recommendation ITU-R M.2150: "Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2020 (IMT-2020)".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

network ID: network identity as defined in ETSI TS 103 636-4 [3]

transmitter ID: transmitter short radio identity ID as defined in ETSI TS 103 636-4 [3]

3.2 Symbols

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

α	Leaky integrator filter forgetting factor
$Band_{high\ edge}$	High edge of the band for blocking signal
$BW_{Interferer}$	Bandwidth of the interfering signal
$Band_{low\ edge}$	Lower edge of the band for blocking signal
f	Frequency
F_c	Carrier centre frequency
$F_{Interferer}$	Frequency offset of the interfering signal from the centre frequency of the desired signal
F_o	Reference carrier centre frequency
F_{OOB}	Δ Frequency of the Out of Band emission
n	Carrier number
$P_{Interferer}$	Received power of the interfering signal
ΔP	Power step size in dB between power control commands
$RX_{channelmax}$	Maximum receiver wanted signal level
$RX_{sensitivity}$	Minimum receiver reference sensitivity
$SNR_{PACKET}(n)$	Signal to Noise Ratio of packet (n)

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 103 636-1 [1] and the following apply:

NOTE: An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in ETSI TS 103 636-1 [1].

ACS	Adjacent Channel Selectivity
EVM	Error Vector Magnitude
FT	Fixed Termination point
IDFT	Inverse Discrete Fourier Transform
NR	New Radio
OFDM	Orthogonal Frequency Domain Modulation
PPM	Parts Per Million
PT	Portable Termination point
RD	Radio Device
RF	Radio Frequency
RMS	Root Mean Square
RSSI	Received Signal Strength Indication
SNR	Signal to Noise Ratio

4 General

4.1 Introduction

The present document defines the minimum requirements for DECT-2020 NR radio devices.

Radio channel arrangements, operating channel bandwidths and supported bands are defined in clause 5. The present document defines operating bandwidths 1,728 MHz, 3,456 MHz and 6,912 MHz. The channel numbering scheme enables to assign channels from 450 MHz up to 5 875 MHz band operating enabling to support up to 17 different operating bands.

For transmitter operation the present document specifies 23 dBm, 19 dBm and 10 dBm maximum output power classes which adapt to different type of application requirement and support battery powered use cases. The transmitter emission masks performance meets the industry requirements. In addition, the transmitter output power can be adjusted down to -40 dBm level, which enables the support for high equipment density use cases. The RX-TX transition time is defined to operate within the Guard Interval (GI), which enables a very competitive low latency operation with hybrid ARQ operation.

Receiver requirement defines the minimum performance for the radio device with hybrid ARQ support. The reference sensitivity levels scales depending on operating bandwidths.

Measurement requirements are defined for channel access purposes and to support radio environment quality reporting.

Radio requirements testing are considered by defining reference channels such that the requirement verification is possible with simple test.

The requirements are defined keeping in mind the state of art performance, low power consumption and competitive implementation cost.

4.2 Relationship between minimum requirements and test requirements

The present document provides DECT-2020 New Radio RF characteristics and minimum performance requirements.

The Minimum Requirements given in the present document make no allowance for measurement uncertainty. Measurement uncertainties for a given requirement may be studied from ETSI TR 100 028-1 [i.1]. These test tolerances are individually defined and/or calculated for each test. The test tolerances are used to relax the minimum requirements in the present document to create test requirements. For some requirements the test tolerances may be set to zero.

The measurement results returned by the test system are compared - without any modification - against the test requirements as defined by the shared risk principle.

The shared risk principle is defined in Recommendation ITU-R M.1545 [4].

4.3 Applicability of minimum requirements

a) In the present document, the Minimum Requirements are specified as general requirements and additional requirements. Where the Requirement is specified as a general requirement, the requirement is mandated to be met in all scenarios.

b) The spurious emissions power requirements are for the long-term average of the power. For the purpose of reducing measurement uncertainty it is acceptable to average the measured power over a period of time sufficient to reduce the uncertainty due to the statistical nature of the signal.

5 Operating bands and channel arrangement

5.1 General

This clause defines the DECT-2020 operating frequency bands, channel bandwidth(s) for communication and operating channel frequencies for the present document release. This clause also defines the radio device reference time accuracy requirement.

5.2 Operating bands

Radio device operating band numbering is defined in table 5.2-1. Radio device may implement one or more band support depending its capabilities.

Table 5.2-1: Operating band numbering

Band number	Receiving band (MHz)	Transmitting band (MHz)
1	1 880 to 1 900	1 880 to 1 900
2	1 900 to 1 920	1 900 to 1 920
3	2 400 to 2 483,5	2 400 to 2 483,5
4	902 to 928	902 to 928
5	450 to 470	450 to 470
6	698 to 806	698 to 806
7	716 to 728	716 to 728
8	1 432 to 1 517	1 432 to 1 517
9	1 910 to 1 930	1 910 to 1 930
10	2 010 to 2 025	2 010 to 2 025
11	2 300 to 2 400	2 300 to 2 400
12	2 500 to 2 620	2 500 to 2 620
13	3 300 to 3 400	3 300 to 3 400
14	3 400 to 3 600	3 400 to 3 600
15	3 600 to 3 700	3 600 to 3 700
16	4 800 to 4 990	4 800 to 4 990
17	5 725 to 5 875	5 725 to 5 875
18	5 150 to 5 350	5 150 to 5 350
19	5 470 to 5 725	5 470 to 5 725

5.3 Operating channel bandwidths

5.3.1 General

This clause defines the transmission channel bandwidths for this release.

NOTE: Additional channel bandwidths option may be added in the future releases.

5.3.2 Channel bandwidth

DECT-2020 NR supports flexible physical layer numerology defined in ETSI TS 103 636-3 [2], clause 4.3, table 4.3-1.

Table 5.3.2-1: Channel bandwidth

Parameter	Operating channel bandwidth I	Operating channel bandwidth II	Operating channel bandwidth III
Nominal channel bandwidth (MHz)	1,728	3,456	6,912
Transmission channel bandwidth (MHz)	1,539	3,051	6,075

5.4 Channel arrangement

5.4.1 Channel spacing

The minimum channel spacing shall be 1,728 MHz between adjacent channels centre to centre frequencies. In wider operating bandwidth cases the channel centre frequencies can be adjusted with 0,864 MHz in bands 1 to 12. For bands 13 to 16 the minimum channel centre frequency step size shall be 1,728 MHz. For bands 17 to 19 the minimum channel centre frequency step size shall be 2 MHz.

5.4.2 Channel raster

The radio transmission is possible with defined channel centre frequencies. Absolute centre frequencies are defined covering the frequency range from 450 MHz to 5 875 MHz. The absolute channel numbers are signalled with 13-bits frequency channel IE defined in ETSI TS 103 636-4 [3].

For bands 1, 2 and 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 the carrier centre frequency is defined by:

$$F_c = F_0 + n \times 0{,}864\ MHz$$

Where:

F_0 = 450,144 MHz; and

n = 1, 2, 3, …, 2 951.

For bands 13, 14, 15 and 16 the carrier centre frequency is defined by:

$$F_c = F_0 + (n - 2\,952) \times 1{,}728\ MHz$$

Where:

F_0 = 3 000,596 MHz; and n = 2 952, 2 953, 2 954, …, 4 104.

For bands 17, 18 and 19 the carrier centre frequency is defined by:

$$F_c = F_0 + (n - 4104) \times 2\ MHz$$

Where:

F_0 = 5 150 MHz; and n = 4 105, 4 106, 4 107, …, 4 466.

The absolute channel numbering range and respective band edge channel frequency are shown in table 5.4.2-1.