



**Wideband data transmission SRD operating in
the frequency range 25 MHz to 1 000 MHz;
Harmonised Standard for access to radio spectrum;
Part 2: Wideband data transmission devices:
terminal node operating in designated bands**

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Foreword

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.3] 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.1].

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 covering Wideband data transmission SRD operating in the frequency range 25 MHz to 1 000 MHz, as identified below:

- Part 1: "Wideband data transmission devices: network access points operating in designated bands";
- Part 2: "Wideband data transmission devices: terminal node operating in designated bands".**

| Proposed national transposition dates | |
|--|---------------------------------|
| Date of latest announcement of this EN (doa): | 3 months after ETSI publication |
| Date of latest publication of new National Standard or endorsement of this EN (dop/e): | 6 months after doa |
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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 test methods to be used in the conformance assessment of wideband data transmission Short Range Device (SRD) terminal node equipment in the frequency range 25 MHz to 1 GHz. The wideband data transmission device category covers radio devices that use wideband modulation techniques to access the spectrum. The present document specifies technical characteristics and methods of measurements for equipment operated in the following designated frequency bands given in Table 1-1:

Table 1-1: Designated frequency bands

| SRD frequency bands | |
|------------------------|--|
| 863 MHz to 868 MHz | According to band no 84 of Commission Implementing Decision (EU) 2022/180 [i.7] and Annex 3 band a1 of CEPT/ERC/REC 70 03 [i.2]. |
| 915,8 MHz to 919,4 MHz | According to band a2 of Annex 3 of CEPT/ERC/REC 70 03 [i.2]. |
| 917,4 MHz to 919,4 MHz | According to band no 2 of Commission Implementing Decision (EU) 2022/172 [i.8]. |

In the designated bands the following types of equipment are defined:

- Type 1: Wideband Data Transmission Terminal Node (TN) in data networks in 863,0 MHz to 868,0 MHz.
- Type 2: Wideband Data Transmission Terminal Node (TN) in data network in 915,8 MHz to 919,4 MHz and in 917,4 MHz to 919,4 MHz:
 - 1) Type 2a: Nomadic Terminal Node (TN) of Type 2 or Mobile Terminal Node (TN) of Type 2.

These radio equipment types are capable of operating in all or part of the relevant frequency bands given in Table 1-1.

NOTE 1: The availability of the frequency bands for type 2 equipment in the European Union and CEPT countries can be obtained from EFIS (<https://efis.cept.org/>) and is also listed in Appendices 1 and 3 of CEPT/ERC/REC 70 03 [i.2].

In addition, it should be noted that, in some countries, part or all of the bands for type 2 equipment may be unavailable, and/or other frequency bands may be available, for networked and/or network based short range devices. See National Radio Interfaces (NRI) as relevant for additional guidance.

NOTE 2: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.1] is given 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.

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2.2 Informative references

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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] 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.2] CEPT/ERC/REC 70-03 (12 February 2022): "Relating to the use of Short Range Devices (SRD)".
- [i.3] 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.4] ECC Report 261 (01-2017): "Short Range Devices in the frequency range 862-870 MHz".
- [i.5] ECC Report 246 (01-2017): "Wideband and Higher DC Short Range Devices in 870-875.8 MHz and 915.2-920.8 MHz (companion to ECC Report 200)".
- [i.6] Recommendation ITU-T O.153 (10/92): "Basic parameters for the measurement of error performance at bit rates below the primary rate".
- [i.7] Commission Implementing Decision (EU) 2022/180 amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices and repealing Decision 2006/804/EC.
- [i.8] Commission Implementing Decision (EU) 2022/172 of 7 February 2022 amending Implementing Decision (EU) 2018/1538 on the harmonisation of radio spectrum for use by short-range devices within the 874-876 and 915-921 MHz frequency bands.
- [i.9] ERC Recommendation 74-01 (May 2019): "Unwanted Emission in the spurious domain".
- [i.10] EN 55016-1-1 (2019): "Specification for radio disturbance and immunity measuring apparatus and methods; Part 1: Radio disturbance and immunity measuring apparatus - Measuring apparatus" (produced by CENELEC).
- [i.11] ETSI TR 100 028 (all parts) (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.12] ETSI EN 304 220-1 (V1.1.0): "Wideband data transmission SRD operating in the frequency range 25 MHz to 1 000 MHz; Harmonised Standard for access to radio spectrum; Part 1: Wideband data transmission devices: network access point operating in designated bands".
- [i.13] ETSI TR 102 273-2: "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.14] ETSI TR 102 273-3: "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.15] ETSI TR 102 273-4: "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.16] ETSI EG 203 336 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); 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:

adjacent channel: frequency range equal to the width of the operating channel immediately above and immediately below the operating channel

NOTE: See Figure 3.1-1.

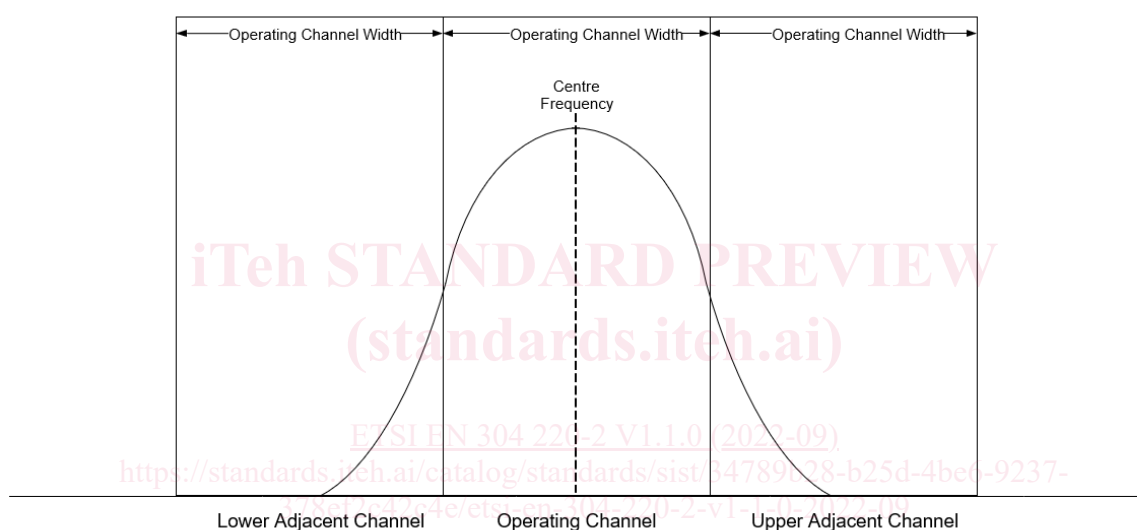


Figure 3.1-1: Adjacent channel definitions

centre frequency: centre frequency of the transmitted signal

Clear Channel Assessment (CCA): procedure of sensing the operating channel to determine whether or not it is occupied by a transmission

conducted measurements: measurements which are made using a direct $50\ \Omega$ connection to the equipment under test

continuous transmission: modulated transmission without interruption for the period of the test

data network: group of wirelessly communicating SRDs composed of a network access point and one or more terminal nodes

dedicated antenna: removable antenna supplied and tested with the radio equipment, designed as an indispensable part of the equipment

dialog: repeated transmit-response cycle between two devices within a transmission

disregard time ($T_{\text{Disregard}}$): manufacturer declared interval below which two separate radio emissions in a channel are considered a single continuous transmitted burst

duty cycle: ratio, expressed as a percentage, of the cumulative duration of transmissions in an observation bandwidth within an observation interval divided by the observation interval

fixed SRD: SRD able to operate only at a fixed geographical location

integral antenna: permanent fixed antenna, which may be built-in, designed as an indispensable part of the equipment

Listen Before Transmit (LBT): mechanism by which an equipment applies Clear Channel Assessment (CCA) before transmission (also known as Listen Before Talk)

master NAP: NAP which enables the operation of nomadic and/or mobile devices

NOTE: Nomadic and mobile terminal nodes (type 2a) are under the control of master NAP in the frequency range of 915,8 MHz to 919,4 MHz and of 917,4 MHz to 919,4 MHz in Europe [i.2] and [i.8].

maximum transmission duration (T_{On-Max}): longest permitted transmission

minimum inter-transmission interval ($T_{Off-Min}$): minimum interval in a channel between two transmissions by the same device

mobile equipment: equipment in operation while moving

Network Access Point (NAP): fixed terrestrial SRD connecting one or more terminal nodes to an external network or service

NOTE: Harmonised standard ETSI EN 304 220-1 [i.12] addresses NAP equipment.

network control information: data intended to construct or maintain a data network

network data: application data carried over a data network

nomadic equipment: equipment for which the location may change but is stationary while in use

nominal operating frequency: frequency at mid-point of the Operating Channel

observation bandwidth: bandwidth in which the energy of an equipment is considered for the purposes of assessing transmission timings

observation period: reference interval of time

occupied bandwidth: width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0,5 % of the total mean power of a given emission

NOTE: See Figure 3.1-2.

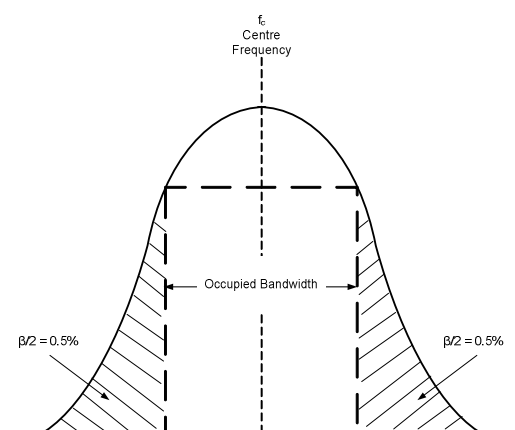


Figure 3.1-2: Signal Occupied Bandwidth

operating channel: frequency range in which transmissions occur

operating channel width: difference between frequency values of the high and low operating channel edges

Permitted Frequency Band (PFB): frequency band or sub-band within which the device is authorized to operate and to perform the intended function of the equipment

radiated measurements: measurements which involve the absolute measurement of a radiated electromagnetic field

signal threshold ($P_{\text{Threshold}}$): absolute signal level (in dBm) above which a transmission is considered to exist for a given receiver bandwidth

spurious emissions: emissions on a frequency or frequencies which are outside the operating channel and the level of which may be reduced without affecting the corresponding transmission of information

NOTE: Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude modulation side band emissions.

Terminal Node (TN): SRD generating and/or consuming network data

transmission: continuous radio emission, or sequence of emissions each separated by an interval $< T_{\text{Disregard}}$, with a signal level greater than the signal threshold in an operating channel

NOTE: See Figure 3.1-3.

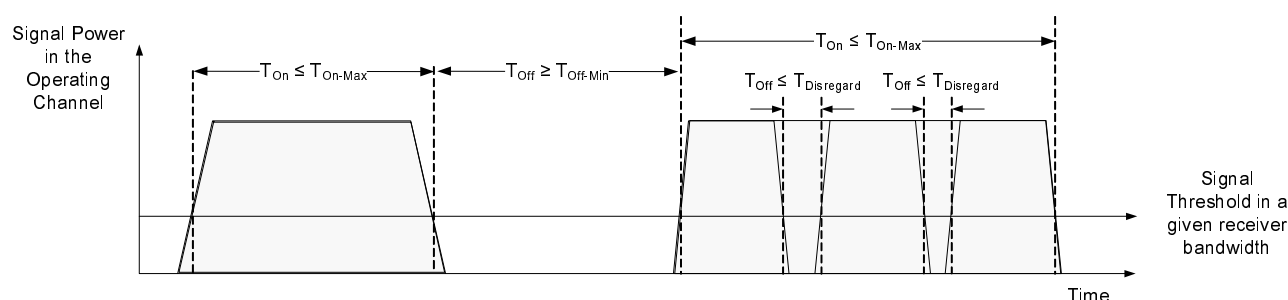


Figure 3.1-3: Transmission definitions

3.2 Symbols

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

| | |
|-----------|--|
| dB | decibel |
| dBm | power level unit expressed in decibel with reference to one milliwatt |
| kbps | kilobits per second |
| Mbps | Megabits per second |
| p | probability of bit error |
| ppm | frequency error relative to desired frequency expressed in parts per million |
| R | data rate |
| S | sensitivity of receiver |
| T_F | fixed listening time in CCA |
| T_L | total listening time in CCA |
| T_{PS} | pseudo random listening time in CCA |
| T_{MRI} | maximum response interval in CCA |
| T_{MRD} | maximum response duration in CCA |
| λ | wavelength |

3.3 Abbreviations

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

| | |
|--------|--|
| ACS | Adjacent Channel Selectivity |
| ARQ | Automatic Repeat reQuest |
| BER | Bit Error Ratio |
| CCA | Clear Channel Assessment |
| CEPT | European Conference of Postal and Telecommunications Administrations |
| CF | Centre Frequency |
| e.r.p. | effective radiated power |
| EC | European Commission |
| ECC | Electronic Communications Committee |

| | |
|--------------------|---|
| EFIS | European Communications Office Frequency Information System |
| EU | European Union |
| EUT | Equipment Under Test |
| FAR | Fully Anechoic Room |
| FEC | Forward Error Correction |
| FOBWhigh | upper Frequency edge of Occupied Bandwidth |
| FOBWlow | lower Frequency edge of Occupied Bandwidth |
| ITU-R | International Telecommunication Union - Radiocommunication |
| LBT | Listen Before Talk |
| LPDA | Logarithmic Periodic Dipole Antenna |
| MAX | Maximum |
| MSR | Message Success Ratio |
| NAP | Network Access Point |
| NRI | National Radio Interfaces |
| OATS | Open Area Test Site |
| OBW | Occupied BandWidth |
| OCW | Operating Channel Width |
| RBW | Resolution BandWidth |
| RBW _{REF} | Reference BandWidth |
| RF | Radio Frequency |
| RMS | Root Mean Square |
| Rx | Receiver |
| SAR | Semi-Anechoic Room |
| SM | Spectrum Management |
| SRD | Short Range Device |
| TN | Terminal Node |
| TR | Technical Report |
| Tx | Transmitter |
| VBW | Video Bandwidth |
| VSWR | Voltage Standing Wave Ratio |

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 performance criteria

For the purpose of the receiver performance tests, the receiver shall produce a raw data signal with a Bit Error Ratio of 10^{-3} without correction after demodulation.

NOTE 1: Bit error ratio can be computed from the Message Success Ratio (MSR) by the expression:

$$\text{MSR} = (1-p)^n$$

where p is the probability of single bit error (10^{-3}) and n the number of bits in the message.

NOTE 2: Some designs may include permanent channel coding as an integral part of information transmission. Such designs may not be able to operate without correction inherent in the channel coding. For the purposes of receiver test suites in the present document, the wanted performance criteria are specified with optional FEC and/or ARQ mechanisms disabled.