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STN	**Pevné zariadenia s krátkym dosahom (SRD) v dátových sieťach Rádiové zariadenia na použitie vo frekvenčnom rozsahu od 870 MHz do 876 MHz s vyžiareným výkonom do 500 mW Harmonizovaná norma pre prístup k rádiovému sprektru**	**STN EN 303 204 V3.1.1** 87 3204

Fixed Short Range Devices (SRD) in data networks; Radio equipment to be used in the 870 MHz to 876 MHz frequency range with power levels ranging up to 500 mW e.r.p.; Harmonised Standard for access to the radio spectrum

Táto norma obsahuje anglickú verziu európskej normy.
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ranging up to 500 mW e.r.p.;
Harmonised Standard for access to the radio spectrum**

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Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.4] 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 Tables A.1 to A.3 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.

National transposition dates	
Date of adoption of this EN:	22 February 2021
Date of latest announcement of this EN (doa):	31 May 2021
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 November 2021
Date of withdrawal of any conflicting National Standard (dow):	31 May 2024

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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Introduction

This revision of the present document has three main purposes:

- To add technical requirements necessary for SRD in data networks introduced in EC Decision 2018/1538 [i.3] using the interpretation of under control of NAP provided by CEPT WGFM and SRD/MG.
- Add the 874,0 MHz - 874,4 MHz harmonised minimum core band to the operational frequency bands.
- To bring the present document in line with current Harmonised Standard editorial practices.

Background

The present document describes performance requirements and conformance test procedures for Short Range Devices (SRDs) intended to operate in association with other SRDs in network topologies supporting the intended applications in the frequency range 870 MHz - 876 MHz at power levels up to 500 mW.

The frequency band is shared with other SRDs intended to support applications with more restrictive power levels.

In some countries the frequency band, or parts of the frequency band, are used for radio services for government and rail applications and use for networks of SRDs may be subject to restrictions. National radio interfaces should be consulted for all intended applications.

The specifications included in the present document are not intended for devices operating at low data rates and in narrow operating channels.

Network of SRDs

Earlier versions of the present document permitted the construction of networks of SRDs with little or no restrictions on technology, topology or architecture. A network could be formed in any topology and be self-contained or form part of a larger inter-network. The latter class of SRD networks were facilitated by certain infrastructure SRDs (Network Relay Points (NRPs), with greater duty cycle allowance than non-NRP devices, providing the relay between the SRD network and an external network or service.

EC Decision 2018/1538 [i.3] identifies a harmonised minimum core band within the frequency range covered by the present document. This core band, 874,0 MHz - 874,4 MHz, is for *SRDs in data networks* and relevant definitions are contained in the EC Decision:

- A network access point in a data network is a fixed terrestrial short-range device that acts as a connection point for the other short-range devices in the data network to service platforms located outside of that data network.
- The term data network refers to several short-range devices, including the network access point, as network components and to the wireless connections between them.
- All devices within the data network shall be under the control of network access points.

The present document aligns its use of terms with those of the EC Decision 2018/1538 [i.3] and replaces NRP with NAP.

Guidance from CEPT WGFM and SRD/MG is adopted for the interpretation of under control of NAP to apply to nomadic and mobile SRDs. The scope of the present document is explicitly defined for only fixed SRD in data networks.

Channel spacing

Earlier versions of the present document aligned with a narrowband/non-narrowband boundary at 25 kHz by specifying a minimum channel spacing/occupied bandwidth of 25 kHz. The present document adds a specific channel spacing requirement with a minimum spacing limit of 25 kHz, and a corresponding test suite to measure operating frequencies and verify correctness of operating frequencies and channel spacing.

Transmission bandwidth

Previous versions of the present document aligned with other harmonised standards for SRDs by specifying operating and adjacent channels in terms of Occupied Channel Width (OCW). OCW and channel spacing were closely related and often identical.

The present document decouples channel spacing from the characterization of the signal. The signal constituting the transmission from the device occupies an amount of spectrum sufficient for the OBW, containing 99 % of the signal power, frequency uncertainties due to drift, and some implementation margin. The resulting bandwidth is defined in the present document as the transmission bandwidth (TBW). TBW is used in the specification of the OOB domain and several other requirements and measurement offsets in the test suites. The concept of TBW is very similar to the ITU concept of necessary bandwidth.

Additional measurements

Certain requirements were previously satisfied by manufacturer declarations of the equipment characteristics. Measurement procedures have been included for all such requirements. Some requirements which were specified in terms of manufacturer declarations with no limits or test cases have been removed.

Functional requirements

Specific requirements have been added to satisfy the EC Decision 2018/1538 [i.3] conditions associated with the core minimum harmonised band:

- A requirement and test suite for NAP has been added as the definition of data network includes a mandatory NAP component. The behaviour of a NAP is also defined in the EC Decision 2018/1538 [i.3].

It should be noted such *functional requirements* do not assess the radio or any characteristics of the emitted signal, but rather concern system level behaviour which is always the subject of higher layer protocols outside the scope of the present document. Thus these requirements and their associated test suites are, by necessity, general in nature in order to preserve technology neutrality throughout the present document.

Disregard time

The present document includes the concept of disregard time which is used for two separate purposes:

- Disregard time > 0 permits signals to be non-continuous e.g. on-off keying or pulsed signals.
- A suitable value of disregard time is also required to permit dialog exchanges.

Details of disregard time treatment are contained in Annex F and clause 4.5.2.

Disregard time is a property of the equipment but is not an intrinsic value which can be measured.

Characteristics and requirements

The present document defines technical requirements to support the essential requirements of clause 3.2 of the Directive 2014/53/EU (Radio Equipment Directive) [i.1] which states "*radio equipment shall be so constructed that it both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference*".

Equipment covered by the present document may operate on a specific frequency or may be channel agile and operate on a number of different frequencies:

- Channel agile SRDs operate on two or more channels with signals constrained to the same limits as non-agile devices.

Transmitter requirements include:

- Frequency accuracy and occupied bandwidth constraints to precisely locate the signal.
- Signal masks to ensure satisfactory out-of-band characteristics both within the operating frequency band and to protect frequencies above and below the operating frequency band.
- Transient emissions from switching of the radio transmitter on and off as occurs at the start and end of each packet or data transmission.

- Spurious domain behaviour to limit potential interference in frequencies far from the operating channel.
- Adaptive/automatic power control to reduce transmitted power in strong link conditions.

Taking into account that SRD in data network equipment operate in channels without specific channel raster, receiver performance is assured by a combination of requirements measured with both strong wanted signals and wanted signals close to sensitivity. Receiver requirements include:

- Sensitivity and co-channel rejection behaviour to ensure equipment operates effectively in the presence of other signals in, or overlapping, the operating channel.
- Adjacent channel selectivity performance to ensure equipment operates effectively in the presence of unwanted signals in frequencies adjacent to the operating channel.
- Blocking performance to ensure equipment operates effectively in the present of unwanted signals beyond the adjacent channels.
- Maximum input signal level to ensure equipment has adequate dynamic range for the shared spectrum environment.

NOTE: Limits for requirements are set to values representative of state-of-the-art RF transceivers and relevant industry interoperability standards, in particular, leading application and industry interoperability specifications for smart energy products. ETSI TS 102 887-1 [i.7] was prepared to support such interoperability specifications.

Polite spectrum access supporting effective and efficient use of the spectrum resource is promoted by Listen Before Talk (LBT) and Short Control Signalling (SCS) transmission requirements. Equipment employing LBT procedures is subject to requirements governing channel sensing:

- Clear channel assessment threshold performance to ensure deferral in the presence of other signals, balanced by the sensitivity requirement to avoid unnecessary deferral where harmful interference would be unlikely.

Although use of LBT is encouraged for all equipment, LBT is only required to be implemented by:

- NAP equipment operating at a duty cycle higher than that permitted for terminal nodes or network nodes.

Equipment is subject to duty cycle limits for overall long term operation in the operational frequency band and timing constraints over short term intervals on any specific operating channel.

- Signal transmissions are constrained in maximum duration and devices are required to wait for specified intervals before again transmitting in a given channel. After transmission limits have been reached on a specific channel, channel agile device operation may continue on a different channel whilst respecting the limits on each channel and overall limits applicable in the operational frequency band.

Informative Annex A is expanded to unambiguously provide the harmonised requirements for each type of equipment.

An informative Annex I explains how the receiver requirements provide coverage for the essential properties of receivers compliant with the present document.

An informative Annex J is added to concisely identify all properties of the equipment which are needed in order to execute the test suites. Such information is usually to be found in the technical specifications of the equipment.

The present document is structured as follows:

- Clause 1 provides a general description of the types of equipment and applicable frequency ranges covered by the present document.
- Clause 2 provides normative and informative references.
- Clause 3 provides the definition of terms, symbols and abbreviations used in the present document.
- Clause 4 specifies the technical requirements.
- Clause 5 specifies general conditions and test suites for testing the conformance of the EUT to the technical requirements.

- Annex A (informative) provides the relationship between the present document and the essential requirements of the Directive 2014/53/EU [i.1] for each type of equipment.
- Annex B (normative) provides specifications concerning radiated measurements.
- Annex C (normative) contains specifications for the test fixture.
- Annex D (informative) provides information on measurement uncertainty.
- Annex E (normative) provides specifications for transmitter measurement offsets.
- Annex F (normative) provides specifications on T_{On} measurements and $T_{Disregard}$ processing.
- Annex G (normative) provides general specifications for receiver test case procedures.
- Annex H (normative) provides general specifications for transmitter test case procedures.
- Annex I (informative) provides explanations of the choice of receiver parameters.
- Annex J (informative) provides information on EUT properties necessary to execute the test suites.
- Annex K contains a bibliography of useful additional information sources.
- Annex L contains a summary of the main changes between versions of the present document.

1 Scope

The present document specifies technical characteristics and methods of measurements for the following types of equipment:

Type 1 equipment: SRDs in data networks:

Type 1a: Terminal nodes

Type 1b: Network nodes

Type 1c: Network access points

Type 1a terminal nodes and type 1b network nodes are fixed SRDs, operating up to 500 mW e.r.p. and with adaptive power control, which are intended to operate in association with other SRDs to form data network topologies supporting the intended application.

Type 1c network access points are specific fixed SRDs, operating up to 500 mW e.r.p. and with adaptive power control, supporting interconnection of a network of SRDs with an external network or service.

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

Table 1: Operating frequency bands

Networked and Network Based SRD frequency bands		
Transmit and receive	870,0 MHz to 874,4 MHz	Type 1a, 1b, 1c equipment
Transmit and receive	874,0 MHz to 874,4 MHz	Type 1a, 1b, 1c equipment
NOTE: The frequency range 870,0 MHz to 874,4 MHz is extended to 870,0 MHz to 875,6 MHz in some countries.		

NOTE 1: 874,0 MHz - 874,4 MHz is a harmonised core band according to EC Decision 2018/1538 [i.3].

NOTE 2: The availability of the frequency bands in Table 1 in European Union and CEPT countries can be obtained from the EFIS (http://www.efis.dk/) and is also listed in Appendices 1 and 3 of CEPT/ERC/REC 70-03 [i.2].

NOTE 3: In addition, it should be noted that, in some countries, part or all of the bands in Table 1 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 4: On non-harmonized parameters, national administrations may impose certain conditions such as the type of modulation, frequency, channel/frequency separations, maximum transmitter radiated power, duty cycle, installation and operation only by professional users and the inclusion of an automatic transmitter shut-off facility, as a condition for the issue of Individual Rights for use of spectrum or General Authorization, or as a condition for use under "licence exemption" as it is in most cases for Short Range Devices.

The present document covers equipment intended for use in a fixed location.

The present document contains requirements to demonstrate that radio equipment both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference.

NOTE 5: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.1] 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] NIST/SEMATECH e-Handbook of Statistical Methods (clause 1.3.5.13): "Runs Test for Detecting Non-randomness", October 2013.

NOTE: Available at http://www.itl.nist.gov/div898/handbook/.

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] 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: "Relating to the use of Short Range Devices (SRD)".

[i.3] Commission Implementing Decision (EU) 2018/1538 of 11 October 2018 on the harmonisation of radio spectrum for use by short-range devices within the 874-876 and 915-921 MHz frequency bands.

[i.4] 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.5] MATLAB® and Statistics Toolbox Release: "The MathWorks", Inc., Natick, Massachusetts, United States.

[i.6] ECC Report 200: "Co-existence studies for proposed SRD and RFID applications in the frequency band 870-876 MHz and 915-921 MHz", September 2013.

[i.7] ETSI TS 102 887-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices; Smart Metering Wireless Access Protocol; Part 1: PHY layer".

[i.8] Recommendation ITU-T O.153 (10-1992): "Basic parameters for the measurement of error performance at bit rates below the primary rate".

[i.9] ETSI TR 100 028 (all parts) (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

[i.10] CISPR 16 (parts 1-1 and 1-4 (2010) part 1-5 (2014)): "Specification for radio disturbance and immunity measuring apparatus and methods; Part 1: Radio disturbance and immunity measuring apparatus".

[i.11] ETSI TR 102 273 (all parts) (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".

[i.12] ETSI EG 203 336 (V1.1.1) (08-2015): "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".