International Telecommunication Union

ITU-R

Radiocommunication Sector of ITU

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Short-range radiocommunication devices measurements

SM Series

Spectrum management

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Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

Policy on Intellectual Property Right (IPR)

ITU-R policy on IPR is described in the Common Patent Policy for ITU-T/ITU-R/ISO/IEC referenced in Resolution ITU-R 1. Forms to be used for the submission of patent statements and licensing declarations by patent holders are available from http://www.itu.int/ITU-R/go/patents/en where the Guidelines for Implementation of the Common Patent Policy for ITU-T/ITU-R/ISO/IEC and the ITU-R patent information database can also be found.

Series of ITU-R Reports

(Also available online at http://www.itu.int/publ/R-REP/en)

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P	Radiowave propagation
RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	**Spectrum management**

***Note**: This ITU-R Report was approved in English by the Study Group under the procedure detailed in Resolution ITU-R 1.*

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(2010-2022)

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1 Introduction

Short-range device (SRD) applications and their associated frequency bands are described in Report ITU-R SM.2153 (former Recommendation ITU-R SM.1538).

Some SRD applications also could benefit from true worldwide harmonization.

Monitoring methods for SRD are described in Report ITU-R SM.2154.

This Report is meant to complete the set of Recommendations and Reports by documenting the measurement methods available for SRDs.

2 The reasons for SRD measurements

Technical SRD measurements performed in test laboratories and performing type approval procedures in addition to and/or supporting spectrum monitoring tasks can be performed for the following reasons:

– Type approval

Type approval is a condition granted to a product when a minimum set of regulatory, technical and/or safety requirements are met. The process of approval is performed on a specific item of a specific manufacturer using one or a set of standards and/or one or more national regulatory frameworks. Type approval is usually performed by governmental institutions and lost much of its popularity due to conformity/compliance testing against technical standards. Usually a product specific labelling and coding method is used to indicate that a product is approved.

– Conformance/Compliance testing

Conformance/Compliance testing are two words for the same process comparable with type approval but with some specific differences. Testing is performed against technical standards that can be relevant in more than a single country. Testing against such a standard may grant a product "approved" in more than a single country. Conformance/Compliance testing is frequently performed by independent institutes operating under a regime agreed by regulators and standardisation institutes. These institutes are called notified bodies. Usually a generic label is used for compliant products.

NOTE 1 – In Europe under the R&TTE Directive there is no requirement to use a notified body to demonstrate compliance.

The main reason for these tests is putting products on the market.

– Enforcement purposes

Enforcement performs measurements for other reasons than putting a product on the market. The most important reason for enforcement measurements is to determine if the product is constructed according the standards for type approval or conformance/compliance. This is usually done when the product is already on the market. The standard for the particular product should guarantee conformance with the regulation if its procedures and limits are followed. It is therefore logical that enforcement uses the same measurement methods as described in the standards. On the other hand, enforcement functions often as a feedback between the regulatory body and the standardisation institute to guarantee that the standards fulfil the regulatory requirements. Alternative measurements could be recommended by the enforcement body.

Another enforcement reason is tracing the origin of a device and the manufacturer/distributor responsible for putting it on the market. This is usually done as part of a normal enforcement measurement procedure and involves checking the markings on the device but also typical technical properties. These properties may be determined by specific measurement procedures such as the behaviour of a device under a specific stimulus. Also, the real life behaviour of a device may be a sign of its nature but this is more a monitoring task.

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– Assistance in the spectrum monitoring task of measuring spectrum occupancy

Spectrum monitoring of short range devices differs to some extent from monitoring of other spectrum users, because of their low power and specific geographical distribution to be effective, some specific guidelines need to be observed such as described in Report ITU-R SM.2154.

To characterise the spectrum occupancy in terms of the number of devices and their location in a RF band where SRDs operate it is necessary to translate the specific time behaviour of a device in actual occupancy. For example, a device that sends a 1 ms pulse every second can be considered active for 100% of time (activity factor) but producing an actual occupancy figure of less than 0.1% (duty cycle). Checking the relevant standards and using the described measurement methods can be used to obtain insight in the working of a device and analyse the occupancy figures properly. This avoids the use of complicated and expensive time domain measurements in the SRD bands.

3 Selection of a measurement method

The selection of a measurement method is described from the point of view of a regulatory body.

The measurement methods contained in technical standards are usually used by industry to place products on the market. This means that the testing methods are sometimes detailed in both setup and procedures, the reason is to have a legal base. For enforcement purposes it is not needed to follow these detailed measurement instructions in all cases. An e.r.p. measurement for example can be performed at a standard test site with standard measurement equipment as long as the value of this parameter can be determined with the same or better uncertainty as with the method in the standard.

Testing is a often a time consuming and expensive process therefore many enforcement agencies use a method called “pre compliance testing”, the used methods are basically the same as described in the standard but with a higher measurement uncertainty and shorter measurement time. This pre compliance test is used to make a selection of devices to be “full compliance tested” (tested in more detail) by the enforcement agency or a in a dedicated test facility. The reason for this two-stage process is to work in a more cost effective way and to enhance the probability of finding non compliant devices. Pre compliance testing may be also performed in the field without a test range as described in the standard.

Standards can be divided into product specific and non specific standards. The reason for this distinction is that certain products use alternative and sometimes complicated methods to fulfil a regulatory requirement that cannot be made mandatory for all devices under the same regulatory regime. It is commonly accepted that if a product specific standard exist the specific product needs to fulfil the requirements in the product specific standard.

A special case of non specific standards are the standards that are used to test for EMC and EMF compliance. These standards do not deal directly with spectrum use but relate to safety limits for health and EMC. The choice for a particular standard and test method must be based on the type of regulation for which the testing takes place. (i.e. spectrum regulation, EMC regulation and EMF regulation.)

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