

TECHNICAL REPORT

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

**Specification for radio disturbance and immunity measuring apparatus and methods –
Part 4-6: Uncertainties, statistics and limit modelling – Statistics on radio
frequency interference (RFI) and verification by measurements in the field**

[CISPR TR 16-4-6:2024](https://standards.iteh.ai/catalog/standards/iec/f30d4ba4-4c85-4ef4-81ab-015071c05d1f/cispr-tr-16-4-6-2024)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**SPECIFICATION FOR RADIO DISTURBANCE AND IMMUNITY
MEASURING APPARATUS AND METHODS –**

**Part 4-6: Uncertainties, statistics and limit modelling –
Statistics on radio frequency interference (RFI) and
verification by measurements in the field**

FOREWORD

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CISPR 16-4-6 has been prepared by CISPR subcommittee H: Limits for the protection of radio services. It is a Technical Report.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
CIS/H/504/DTR	CIS/H/513/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the CISPR 16 series, published under the general title *Specification for radio disturbance and immunity measuring apparatus and methods*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
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INTRODUCTION

In 2018, work started in CISPR/H to undertake a fundamental review of CISPR TR 16-4-4:2007, CISPR TR 16-4-4/AMD1:2017 and CISPR TR 16-4-4/AMD2:2020 [1]¹. As a result of this review, it was decided to transfer the content on statistics of complaints in Clause 4 to a new publication, as the content of this clause was quite disconnected from the limit modelling part of CISPR TR 16-4-4 [1]. A cross-reference list of CISPR TR 16-4-4 [1] and this document is given in Annex E. Note that with reorganization of CISPR 16 in 2003, the recommendations on statistics of interference complaints were moved from CISPR TR 16-3:2002 (first edition) to Clause 4 of CISPR TR 16-4-4:2003 (first edition).

In the past interference on analogue radio reception, for example television, was easy to detect. With the shift to newer technologies the recognition of interference is more difficult. Nevertheless, submission of statistical data on complaints is still considered an important instrument to verify the suitability of CISPR publications, as they are widely adopted in various regions and countries for market access of equipment.

The recommendations for reports on statistics of complaints in CISPR TR 16-4-4 were found also to be outdated and not suitable to analyse and interpret the interference complaints that are often reported within CISPR and its subcommittees. Therefore, it was decided also to add additional recommendations in this new CISPR publication to enable proper analysis of these complaints and subsequently to implement appropriate changes in the CISPR publication concerned. With these additions, this CISPR publication on statistics of radio frequency interference serves as a more meaningful feedback loop on how effective the limits and test methods in CISPR publications are.

This CISPR publication is intended for any party having an interest in aggregation and subsequent submission of statistical data to CISPR, either as a CISPR liaison, or via the respective National Committee. It addresses radio frequency interference incidences and reported cases which could be traced back to having been caused by use as intended in the given category of electromagnetic environment, of any kind of electric/electronic equipment, system or installation being conformant with the provisions of CISPR standards.

This document provides a methodology for the systematic collation, aggregation and verification of interference in the given environment, or in general any investigations into reported radio frequency interference cases.

The latter more administrative activity incorporates the aggregation of statistical data on interference complaints. These could be traced back to having been caused by operation and use of any kind of closely co-located and well-maintained or also defective electric/electronic equipment, systems or installations and radio receivers in the field or also by other shortcomings in the local conditions of use of such equipment, radio receivers, or by lack of service coverage or other reasons. This document can be used to prepare reports on the statistics of interference complaints in line with the provisions set out in Chapter IV, Article 15, Section VI of the ITU Radio Regulations 2020 [2], see also Appendix 10 of these ITU Radio Regulations [2].

¹ Numbers in square brackets refer to the Bibliography.

SPECIFICATION FOR RADIO DISTURBANCE AND IMMUNITY MEASURING APPARATUS AND METHODS –

Part 4-6: Uncertainties, statistics and limit modelling – Statistics on radio frequency interference (RFI) and verification by measurements in the field

1 Scope

This part of CISPR 16, which is a Technical Report, applies to the acquisition, processing and preparation of statistical data of radio interference cases to facilitate the evaluation of the effectiveness of CISPR standards with respect to their potential to prevent radio frequency interference (RFI).

This document also provides a method for the analysis and evaluation of the residual risk of occurrence of the incidence of RFI in the electromagnetic environment.

This document also provides guidance for how an interested party can verify the root cause of RFI. This can be applied to either a reported RFI case or a case otherwise suspected of constituting an “RFI scenario”, by inspection and field strength measurements at the local site in the given electromagnetic environment.

Acquisition of statistical data according to this document only encompasses RFI incidences which affect radio reception by radio receivers or respective receiver components.

2 Normative references

[CISPR TR 16-4-6:2024](https://standards.iteh.ai/document/60524/cispr-tr-16-4-6-2024)

<https://standards.iteh.ai/document/60524/cispr-tr-16-4-6-2024> There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1.1

complaint

report containing information on radio frequency interference (RFI) observed on radio receiving equipment

EXAMPLE Report received by a national RFI investigation service from a citizen containing information on an RFI incident including or not including a request for assistance.

3.1.2

RFI investigation service

entity investigating reported cases of radio frequency interference (RFI)

EXAMPLE Examples of institutions include regulatory authorities and special interest groups.

3.1.3

source

any electric or electronic equipment, system, or (part of an) installation generating electromagnetic emissions in the radio frequency (RF) range which can cause radio frequency interference to radio receiving equipment

Note 1 to entry: Electric and electronic equipment can be a source of electromagnetic energy when they contain active components or modules, such as switched mode power supplies, power electronic components, electric motors and thermostats.

3.1.4

electromagnetic disturbance

any electromagnetic phenomenon that can degrade the performance of a device, equipment or system, or adversely affect living or inert matter

Note 1 to entry: An electromagnetic disturbance can be an electromagnetic noise, an unwanted signal, or a change in the propagation medium itself.

Note 2 to entry: In this document, the phrase “propagation medium” is taken as the propagation mechanism or means, an example being leakage from a coaxial cable or by mode conversion in a balanced pair cable.

[SOURCE: IEC 60050-161:2018, 161-01-05, modified – Notes 2 and 3 have been removed and a new Note 2 has been added.]

3.1.5

radio frequency disturbance

RF disturbance

RF interference

RFI

electromagnetic disturbance having components in the radio frequency range

Note 1 to entry: In accordance with IEC 60050-161:2018, the radio frequency range comprises by convention all frequencies which are lower than 3 000 GHz.

Note 2 to entry: The disturbance can also present the accumulation of disturbance components from more than one, i.e., from multiple disturbance sources.

Note 3 to entry: The English words “interference” and “disturbance” are often used indiscriminately.

Note 4 to entry: The word interference is used short term for radio frequency interference in this document.

[SOURCE: IEC 60050-161:2018, 161-01-13, modified – In the terms, “radio disturbance” has been removed, RF interference is no longer a deprecated term, and “RFI” has been added; in addition, the original Note 2 has been renumbered as Note 1 and Notes 2 and 3 have been added. A Note 4 for clarification of the short term use has been added.]

3.1.6

root cause of RFI

local conditions and circumstances in the electromagnetic environment causing a radio frequency interference case

Note 1 to entry: Such conditions and circumstances can relate to phenomena in the electromagnetic environment (e.g., very high ambient noise), to the equipment with the radio receiving function incorporated (e.g. insufficient immunity), or to the equipment producing the unwanted radio frequency energy (e.g. via a special coupling mechanism).

3.1.7

interference incidence

event, detected as degradation in the quality of radio reception, that drops below the necessary quality of service or quality of experience

Note 1 to entry: The quality of experience can be defined in ITU documents.

Note 2 to entry: The probability of an interference incident is binary either there is or there is not an interference incidence.

Note 3 to entry: Interference incidence does not by itself state the severity of the incidence.

3.1.8

incidence distance

shortest distance between the particular disturbance source and the antenna of the disturbed radio receiver

Note 1 to entry: If a machine or installation causing interference is in a dedicated building/premises, the distance can be measured from the boundary of that premises/building.

3.1.9

protection distance

distance between the source of a radiated disturbance and the victim receiver at the edge-of-service area used for the derivation of a specific CISPR limit for radiated disturbance

Note 1 to entry: The edge-of-service area is defined by the minimum value of the wanted field strength of a radio service or application derived from ITU-R specifications.

Note 2 to entry: This definition can vary in other publications, when conducted disturbances are concerned.

Note 3 to entry: Every limit has an associated protection distance; the protection distance can vary with frequency.

[SOURCE: CISPR 16-2-3:2016/AMD1:2019 [19], 3.1.34]

3.1.10

target

figure, value, ratio or the like of a given parameter recommended by CISPR as criterion for the assessment as to whether or not a detected RFI incidence can be considered a case of harmful interference

Note 1 to entry: Target figures are recommended by CISPR for use as reference, guideline and measure for the overall evaluation of reported RFI cases or results of survey measurements aiming at data gathering for indication of the residual risk of radio frequency interference, in the electromagnetic environment.

3.1.11

residual risk

remaining risk of an interference incidence when the requirements of the applicable CISPR standards are met

3.1.12

harmful interference

Interference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with Radio Regulations

[SOURCE: ITU Radio Regulations:2020 [2], 1.169]

3.1.13

radio function

function that provides either a radiocommunication interface, or a radiodetermination interface, or both