

International Telecommunication Union

ITU-R
Radiocommunication Sector of ITU

Recommendation ITU-R SM.2129-0
(08/2019)

**Guidance on frequency ranges for operation
of non-beam wireless power transmission
systems for mobile and portable devices**

SM Series
Spectrum management

Foreword

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RA	Radio astronomy
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SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
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Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

Electronic Publication
Geneva, 2019

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RECOMMENDATION ITU-R SM.2129-0

Guidance on frequency ranges for operation of non-beam wireless power transmission systems for mobile and portable devices

(2019)

Scope

This Recommendation provides guidelines for the use of frequency ranges for the operation of non-beam wireless power transmission (WPT) for charging mobile and portable devices.

Keywords

Wireless power transmission, short-range devices, ISM, non-beam, mobile, portable

Abbreviations/Glossary

CISPR:	In French “Comité International Spécial des Perturbations Radioélectriques”, International Special Committee on Radio Interference
ICNIRP:	International Commission on Non-ionizing Radiation Protection
IEC:	International Electrotechnical Commission
ISO:	International Organization for Standardization
ISM:	Industrial, Scientific, Medical
RR:	Radio Regulations
WHO:	World Health Organization
WPT:	wireless power transmission

Related ITU Recommendations, Reports

Recommendation ITU-R SM.1056; Recommendation ITU-R SM.1896; Report ITU-R SM.2153; Report ITU-R SM.2303; Report ITU-R SM.2449-0

The ITU Radiocommunication Assembly,

considering

- a)* that wireless power transmission (WPT) is defined as the transmission of power from a power source to an electrical load wirelessly using the electromagnetic field;
- b)* that WPT technologies utilize various mechanisms, such as transmission via radio frequency radiated transmissions in the far field (WPT beams) and near-field inductive, resonant and capacitive coupling (WPT non-beam);
- c)* that such WPT technologies are used in applications to charge mobile and portable devices;
- d)* that there is potential consumer demand for WPT technologies and associated applications used for mobile and portable devices;
- e)* that WPT standards are currently being developed at national, regional and international levels;
- f)* that industrial alliances, consortia, and academia have investigated several frequency bands for WPT technologies, including magnetic resonant and induction technology for mobile devices in several frequency ranges;

- g) that for the purposes of WPT studies the standard frequency and time signal and the radio astronomy services are to be treated as radio communication service;
- h) that studies have been conducted on the impact of non-beam WPT applications for mobile and portable devices to radiocommunication services in the frequency ranges 100-148.5 kHz and 6 765-6 795 kHz;
- i) that as more WPT devices proliferate globally, ITU-R is developing guidance to minimize the impact of using WPT technologies on radiocommunication services including the standard frequency and time signal service and the radio astronomy service;
- j) that the WPT devices should not cause interference to radiocommunication services in any frequency band;
- k) that to mitigate the impact of WPT devices on the operation of radiocommunication services some solutions utilize frequency bands designated for Industrial, Scientific, Medical (ISM) applications;
- l) that issues of non-ionizing radiation exposure are dealt with by international organizations such as the World Health Organization (WHO), the International Commission on Non-ionizing Radiation Protection (ICNIRP), and International Electrotechnical Commission TC106, and that ICNIRP 2010 provides guidelines for limiting exposure (up to 10 MHz), and ICNIRP 1998 provides Guidelines for limiting exposure (up to 300 GHz),

recognizing

- a) that WPT is not a radiocommunication service and has no status in the Radio Regulations (RR), but may be regarded as subject to Nos. **15.12** or **15.13** as the case may be;
- b) that the criteria to protect various radiocommunication services from harmful interference are specified in existing ITU-R Recommendations;
- c) that both consumers and manufacturers may benefit from harmonized frequency ranges and technical conditions for WPT technologies;
- d) that frequency bands designated for ISM applications have been successfully used in the past for development and proliferation of innovative technologies in accordance with the RR;
- e) that the band 6 765-6 795 kHz, which is designated for ISM use under RR No. **5.138** has been found to have advantages for WPT using magnetic resonance technologies in applications of charging of mobile/portable devices;
- f) that some administrations classify the non-beam WPT energy transfer as an ISM application, even for operation outside bands designated for ISM use;
- g) that some administrations classify non-beam WPT systems as radio applications such as Short-Range Devices;
- h) that some non-ISM bands are taken into consideration for the global or regional harmonized use of specific WPT applications;
- i) that the WPT energy transfer can be treated separately from data communications, especially when the receiving device receives data communications at a frequency different from that for the energy transfer;
- j) that in the absence of a load, the WPT shuts off and only periodically polls or searches for the load, with very low duty cycle;
- k) that for non-beam WPT, the radiated power is much lower than RF power transferred (most power is transferred to the receiver through mechanisms such as capacitive, resonant and inductive coupling);

l) that Recommendation ITU-R SM.1056 on the limitation of radiation from ISM equipment recommends that administrations consider the use of the latest edition of CISPR publication 11, and that these limits do not necessarily protect radio communication services,

noting

that the International Electrotechnical Commission (IEC) has published a Technical Report IEC/TR 62869 on Wireless Power Transfer for audio, video and multimedia systems and equipment developed by TC 100,

recommends

1 that administrations should consider as a guideline the use of the frequency range, or portions thereof, listed in Table 1 below for the operation of non-beam WPT systems for mobile and portable devices;

2 that necessary steps should be taken to ensure that non-beam WPT applications and equipment do not cause harmful interference to radiocommunication services, including the standard frequency and time signal service and the radio astronomy service, so that these remain protected from radio frequency energy emanating from WPT equipment and falling into all bands.

TABLE 1

Frequency ranges for operation of non-beam WPT systems for mobile and portable devices

Frequency range	Non-beam WPT technologies
6 765-6 795 kHz Note: See RR No. 5.138	Magnetic resonant technology
100-148.5 kHz	Inductive technology