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| U.S. Radiocommunications Sector  Fact Sheet | |
| **Working Party:** ITU-R WP1A | **Document No:** USWP1A-02 |
| **Ref:**  Recommendation ITU-R SM.2151 – *Guidance on frequency ranges for operation of wireless power transmission via radio frequency beam systems for mobile/portable devices and sensor networks* | **Date:** 1 March 2023 |
| Document Title: Update to Recommendation ITU-R SM.2151 to include 24 GHz band | |
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| **Purpose/Objective:** Submit further information on frequencies for use by Beam WPT systems and support the approval of the document at this meeting. | |
| **Abstract:** This contribution returns the 24 GHz ISM band to TABLE 1: Frequency ranges for operation of beam WPT systems. | |

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| PROPOSED REVISIONS TO RECOMMENDATION ITU-R SM.2151-0  Guidance on frequency ranges for operation of wireless power transmission via radio frequency beam systems for mobile/portable devices and sensor networks | |
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Background

During the 28 June – 7 July 2022 meeting of Working Party (WP) 1A, the frequency recommendations proposed in this document for the use of Beam WPT systems were discussed, and a consensus was reached on the text of the recommendation. Earlier drafts included a 24.1-24.15 GHz band, which was also included at that time in the draft of what became Report ITU-R SM.2505. However, this band was not included in the approved Report ITU-R SM.2505, so it was deleted from Recommendation ITU-R SM.2151 when that was approved.

An updated 24 GHz Bean WPT impacts analysis is now being submitted for WP1A’s consideration for Report ITU-R SM.2505 and, should it be approved for inclusion there, then the attached update to Recommendation ITU-R SM.2151 should also be considered.

Proposal

This contribution updates the frequencies in Table 1 to reflect those agreed in principle during the previous meetings of ITU-R WP1A.

**Attachment:** 1

attachment

RECOMMENDATION ITU-R SM.2151-0

Guidance on frequency ranges for operation of wireless power transmission via radio frequency beam for mobile/portable devices and sensor networks

(2022)

Scope

This Recommendation provides guidance on frequency ranges for the operation of wireless power transmission (WPT) via radio frequency beam (beam WPT), including wireless charging of mobile/portable devices and wireless powered & charging of sensor networks, but not including WPT for electric vehicles.

Keywords

Wireless power transmission, radio frequency beam, beam WPT, ISM, short-range devices

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

ISM Industrial, scientific and medical

RR Radio Regulations

WHO World Health Organization

WPT Wireless power transmission

Related ITU Recommendations, Reports

Recommendation ITU-R [SM.1056](https://www.itu.int/rec/R-REC-SM.1056/en)

Recommendation ITU-R [SM.1896](https://www.itu.int/rec/R-REC-SM.1896/en)

Report ITU-R [SM.2153](https://www.itu.int/pub/R-REP-SM.2153)

Report ITU-R [SM.2392](https://www.itu.int/pub/R-REP-SM.2392)

Report ITU-R [SM.2505](https://www.itu.int/pub/R-REP-SM.2505)

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 an electromagnetic field;

*b)* that WPT technologies utilize various mechanisms, such as transmission via radio frequency radiation in the far field (beam WPT) and near-field inductive, resonant and capacitive coupling (non‑beam WPT);

*c)* that beam WPT technologies may be useful in various applications, including wireless charging of mobile/portable devices and wireless powered and charging of sensor networks;

*d)* that there is potential customer demand for beam WPT technologies for such applications and associated applications;

*e)* that WPT standards are currently being developed at national, regional and international levels;

*f)* that some beam WPT utilize frequency bands designated for Industrial, Scientific and Medical (ISM) applications and some systems utilize different frequency ranges;

*g)* 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;

*h)* that administrations wishing to introduce and bring into use beam WPT applications should consider the exposure limits for non-ionizing electromagnetic fields (see *noting c)*),

recognizing

*a)* that WPT has no status in the RR and that, under Nos. **15.12** and **15.13**, administrations shall take all practicable steps to ensure this equipment does not cause harmful interference to a radiocommunication service, in particular to a radionavigation or any other safety service;

*b)* that when considering beam WPT as an ISM application, RR Nos. **5.138**, **5.150** and **15.13** should be taken into consideration;

*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 some non-ISM bands are taken into consideration for the global or regional harmonized use of specific WPT applications;

*f)* that WPT can be treated separately from data communications, especially when the receiving device receives data communications at a frequency different from that for the energy transmission;

*g)* that some administrations classify beam WPT as an ISM application, even for operation outside the bands designated for ISM applications;

*h)* that some administrations classify beam WPT as radio applications such as short-range devices, operating in some bands listed in Recommendation ITU-R [SM.1896](https://www.itu.int/rec/R-REC-SM.1896/en) and Report ITU-R [SM.2153](https://www.itu.int/pub/R-REP-SM.2153);

*i)* that in order to address adequate protections for radiocommunication services from any harmful interference, some administrations may classify certain applications of WPT beam operation as a radio service;

*j*) that duration or power limits can be placed on WPT,

noting

*a)* that the International Electrotechnical Commission (IEC) has published Technical Reports IEC/TR 62869 on “Activities and considerations related to wireless power transfer (WPT) for audio, video and multimedia systems and equipment” and IEC/TR 63231 on “Consideration of energy efficiency in wireless power transfer technology” and IEC/TR 63239 on “Radio frequency beam wireless power transfer (WPT) for mobile devices” developed by TC 100;

*b)* that this Recommendation will assist administrations in applying Nos. **15.12** and **15.13** not to cause harmful interference to a radiocommunication service from the operation of WPT equipment used for non-ISM and ISM applications, respectively;

*c)* that Recommendation ITU-R [SM.1056](https://www.itu.int/rec/R-REC-SM.1056/en) on the limitation of radiation from ISM equipment recommends that administrations consider the use of the latest edition of CISPR publication 11;

*d)* that Report ITU-R [SM.2392](https://www.itu.int/pub/R-REP-SM.2392) discusses applications of wireless power transmission via radio frequency beam;

*e)* that Report ITU-R [SM.2505](https://www.itu.int/pub/R-REP-SM.2505) provides impact studies information related to the use of some beam WPT,

recommends

**1** that administrations may consider as guidance the use of the frequency ranges, or portions thereof, listed in the Table 1 below, for the operation of beam WPT for mobile/portable devices and charging of sensor networks;

**2** that necessary steps should be taken to ensure that beam WPT does not cause harmful interference to radiocommunication services, so that radiocommunication services remain protected from radio frequency energy emanating from WPT operations falling into all bands.

TABLE 1

**Frequency ranges for operation of beam WPT**

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| **Frequency range** | **Suitable beam WPT technologies and applications** |
| 915-921 MHz | Wireless charging of mobile/portable devices  Wireless powered and charging of sensor networks |
| 2 410-2 483.5/2 486 MHz |
| 5 725-5 875 MHz |
| 24.1-24.15 GHz |
| 61-61.5 GHz |
| NOTE 1 – The frequency ranges listed in this Table indicate those with possible use for beam WPT, noting that some frequency ranges may not be designated for ISM applications, and may not be available for beam WPT applications in some countries, as a result of the different national allocations and regulatory conditions.  NOTE 2 – In some administrations in Regions 1 and 3, the compatibility study of beam WPT is still ongoing and the available frequency ranges for beam WPT are still under consideration. | |

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