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**APT RECOMMENDATION on Frequency Ranges for Non-Beam WPT** **for Mobile Devices**

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**Approved by**

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**APT RECOMMENDATION on Frequency Ranges for Non-Beam WPT** **for Mobile Devices**

**Scope**

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

**Keywords**

Wireless Power Transmission; Short-Range Devices; Industrial, Scientific, Medical; non-beam

**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 Standard Organization

ISM: Industrial, Scientific, Medical

GSC: Global Standards Collaboration

RR: Radio Regulations

SAE: Society of Automotive Engineers

WHO: World Health Organization

WPT: Wireless Power Transmission

WRC-19: World Radiocommunication Conference 2019

**Related APT and ITU-R Recommendations, Reports**

[APT/AWG/REP-48](http://www.aptsec.org/AWG-RECS-REPS), APT Survey Report on "Wireless Power Transmission"; [[APT/AWG/REP-62(Rev.1)](http://www.aptsec.org/sites/default/files/Upload-files/AWG/APT-AWG-REP-62Rev.1_APT_Report_on_WPT.docx)](http://www.aptsec.org/AWG-RECS-REPS), APT Report on "Wireless Power Transmission (WPT)"; [Recommendation ITU-R SM.2110-0](http://www.itu.int/rec/R-REC-SM.2110/en); [Recommendation ITU-R SM.1056](http://www.itu.int/rec/R-REC-SM/en); [Recommendation ITU-R SM.1896](http://www.itu.int/rec/R-REC-SM/en); [[Report ITU-R SM.2153](http://www.itu.int/pub/R-REP-SM.2153)](http://www.itu.int/pub/R-REP-SM/en); [[Report ITU-R SM.2303](http://www.itu.int/pub/R-REP-SM.2303)](http://www.itu.int/pub/R-REP-SM/en).

The Asia-Pacific Telecommunity (APT),

considering

*a)* that wireless power transmission (WPT) is defined as the transmission of power from a power source to an electrical load using electromagnetic field;

*b)* that WPT technologies utilize various mechanisms, such as transmission via radio frequency beams, inductive, resonant and capacitive coupling;

*c)* that such WPT technologies may be useful in applications of charging of mobile/portable devices and electric vehicles etc.;

*d)* that WPT standards are currently being developed at national, regional, and international levels for the above-mentioned wireless charging of mobile devices and electric vehicles, etc.;

*e)* that industrial alliances, consortia, and academia have investigated several frequency bands for WPT technologies, including; 19‑21 kHz and 59‑61 kHz for the shaped magnetic field in resonance for electric vehicles, 79‑90 kHz for magnetic resonant technology for electric vehicles, 100‑300 kHz for magnetic resonant and induction technology for mobile devices and 6 765‑6 795 kHz for magnetic resonant technology for mobile devices;

*f)* that studies have been concluded by one administration on the impact of WPT to radiocommunication services in the bands 79‑90 kHz and 6 765‑6 795 kHz, another administration undertook studies on the impact of WPT in the band 110‑300 kHz and some administrations already authorize use of some of these bands for WPT technologies;

*g)* that as the number of WPT devices is growing the use of WPT technologies may have an impact on the operation of radiocommunication services including the standard frequency and time signal service and the radio astronomy service;

*h*) that radiation outside the bands used by WPT should be minimized in order to preserve the RF spectrum of radiocommunication services;

*i)* 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;

*j)* 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 has no status in the Radio Regulations (RR) and therefore should not cause interference to radiocommunication services including the standard frequency and time signal service and the radio astronomy service;

*b)* that both consumers and manufacturers will benefit from common spectrum bands used for WPT technologies;

*c)* that Industrial, Scientific, Medical (ISM) frequencies have been successfully used in the past for development and proliferation of innovative technologies in accordance with the RR;

*d)* the band 6 765-6 795 kHz also 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;

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

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

*g)* that some Administrations classify the non-beam WPT energy transfer as an ISM application, even for operation outside bands designated for ISM use;

*h*) that some Administrations classify non-beam WPT systems as Short-Range Devices, and operating in some bands listed in Recommendation ITU-R SM.1896 and Report ITU-R SM.2153;

*i)* 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;

*j*) that for WPT (non-beam), 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;

*k)* that at VLF, LF and MF frequencies the environment is already very noisy relative to the victim’s thermal noise floor, due to atmospheric and man-made noise;

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

*noting*

*a)* 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;

*b)* that the IEC 61980 series, International Standard Organization (ISO) 19363, and the Society of Automotive Engineers (SAE) International J2954 are developing international standards intended for global and regional harmonization on electric vehicle WPT systems;

*c)* that Resolution Global Standards Collaboration (GSC)-17/34 resolves to facilitate a strong and effective standards collaboration on WPT in terms of protocol, regulatory and interoperability aspects;

*d)* that this Recommendation will assist administrations in applying RR No. **15.13** to prevent harmful interference to a radiocommunication service from equipment used for industrial, scientific and medical applications;

*e)* 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;

*f)* that APT Report APT/AWG/REP-62 and Report ITU-R SM.2303 discuss WPT using technologies other than radio frequency beam,

*recommends*

that administrations should consider as a guideline the use of the frequency range listed in the following table for the operation of non-beam WPT systems and should take steps to ensure that radiocommunication services including the standard frequency and time signal service and the radio astronomy service are protected from WPT operations, including consideration of unwanted radio frequency energy (such as radiated electromagnetic disturbances) falling into all bands.

Table 1

**Frequency range for operation of non-beam WPT systems**

|  |  |
| --- | --- |
| **Frequency range** | **Suitable non-beam WPT technologies and applications** |
| 6 765‑6 795 kHzNote: See RR No. **5.138** | Magnetic resonant technology for mobile devices |

Note: This table lists only one frequency range since no global harmonization for other frequency ranges could be reached at the moment of publication. This does not mean that the mentioned frequency range is the most suitable or the only available range for WPT.

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