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| **Radiocommunication Study Groups** | A blue logo with a black background  Description automatically generated |
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| Received: Date 2024Subject: Working Document Towards a Preliminary Draft Revision of Recommendation ITU-R SM.2110-1 | **Document 1A/xx-E** |
| **Date 2024** |
| **English only** |
| United States of America |
| Working Document Towards a Preliminary Draft Revision of Recommendation ITU-R SM.2110-1 |
| US Proposal for Updates and Elevation |

Background

In the June 2023 WP1A meetings, the working document towards a preliminary draft revision of Recommendation ITU-R SM.2110-1, Annex 5 of the Chairman’s Report, was carried forward. This working document provides several important updates based on the most recent information. However, Annex 5 in the Chairman’s Report does not correctly reflect changes against the published edition.

Discussion

The United States of America (USA) has reviewed Annex 5 of the Chairman’s Report and has compared this annex with the published version of Recommendation ITU-R SM.2110-1. The USA recommends updating the document redlines to be tracked against the published version of Recommendation ITU-R SM.2110-1.

Additionally, the USA recognizes that an additional frequency band of 22-25 kHz is being proposed and that there is a question as to whether additional studies are required before adding this band. The USA notes that a liaison statement was sent to WP 7A in the June 2023 WP 1A meeting on this topic. Furthermore, it should be noted that the purpose of the proposed frequency range is to assist in concerns brought forth by WP 7A regarding SFTS and more specifically, the overlap caused by the third harmonic proposed usage from the 19-21 kHz band in the 63-65 kHz band. The USA proposes that the studies already included in Report ITU-R SM.2451 for the 19-21 kHz band would already cover the 22-25 kHz band in that concerns would be generally lessened from any impacts caused by the 19-21 kHz band. Furthermore, the usage of magnetic resonance by WPT-EV results in an unmodulated single-carrier frequency with power transfer occurring only in the near-field, and there is no proposal to utilize the 3rd harmonic for power transfer as is the case for the 19-21 kHz band.

Proposal

Based on the information provided and a review of Annex 5 of the Chairman’s report, the USA proposes the following:

1. Tracked changes for the working document towards a preliminary draft revision of Recommendation ITU-R SM.2110-1 should be based on the published version. The USA attachment provides these tracked changes accordingly.
2. Editorial updates to the working document towards a preliminary draft revision of Recommendation ITU-R SM.2110-1. The USA provides these updates in track changes highlighted in green.
3. Elevation of the working document towards a preliminary draft revision of Recommendation ITU-R SM.2110 to preliminary draft status.

**Attachment(s):** USA proposed updates to the working document towards a preliminary draft revision of Recommendation ITU-R SM.2110-1

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Attachment

*[USA Note (not for inclusion): The changes below are changes in Annex 5 of the Chairman’s report tracked against the published edition. The changes that are different from Annex 5 of the Chairman’s Report and are newly proposed changes by the USA are highlighted in green.]*

PRELIMINARY DRAFT REVISION OF RECOMMENDATION ITU-R SM.2110-1

**Guidance on frequency ranges for operation of non-beam
wireless power transmission for electric vehicles**

(Question ITU-R [210-4](https://www.itu.int/en/publications/ITU-R/pages/publications.aspx?lang=en&parent=R-QUE-SG01.210)/1)

(2017-2019)

**Scope**

This Recommendation provides guidance on frequency ranges for the operation of non-beam wireless power transmission (non-beam WPT) for electric vehicles (EV).

**Keywords**

Wireless power transmission, short-range devices, ISM, non-beam WPT

**Abbreviations/Glossary**

CISPR In French “Comité International Spécial des Perturbations Radioélectriques”,
 International Special Committee on Radio Interference

ICES International Committee on Electromagnetic Safety

ICNIRP International Commission on Non‑ionizing Radiation Protection

IEC International Electrotechnical Commission

IEEE Institute of Electrical and Electronics Engineers

ISO International Organization for Standardization

ISM Industrial, scientific, medical

RR Radio Regulations

SAE Society of Automotive Engineers

SFTS Standard frequency and time signal service

WHO World Health Organization

WPT Wireless power transmission

WPT-EV Wireless power transmission for electric vehicles

**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); Recommendation [ITU-R SM.2129](https://www.itu.int/rec/R-REC-SM.2129); Report [ITU-R SM.2153](https://www.itu.int/pub/R-REP-SM.2153); Report [ITU-R SM.2303](https://www.itu.int/pub/R-REP-SM.2303); Report [ITU‑R SM.2451](https://www.itu.int/pub/R-REP-SM.2451).

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 WPT technologies are being considered for applications such as charging of electric vehicles;

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

*e)* that industrial alliances, consortia, and academia have investigated several frequency bands for WPT technologies, including; 19‑21 kHz and 55‑65 kHz for the shaped magnetic field in resonance for electric vehicles, 22-25 kHz and 79‑90 kHz for magnetic resonant technology for electric vehicles;

*f)* that for the purpose of WPT studies the standard frequency and time signal and the radio astronomy services are to be treated as radiocommunication service;

*g)* that studies have been conducted on the impact of non-beam WPT to radiocommunication services in the bands 19-21 kHz, 55-57 kHz, 63-65 kHz and 79‑90 kHz;

[USA Note (not for inclusion): The Editor’s note below is unnecessary for the reasons provided in the discussion text.]

*h)* that as more WPT devices proliferate globally, the use of WPT technologies may have an impact on radiocommunication services including the standard frequency and time signal service and the radio astronomy service, WPT must not cause harmful interference to radio communication 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,

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

*e)* that some Administrations classify non-beam WPT systems as radio application such as short-range devices;

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

*g)* 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;

*h)* that in the absence of a load, the WPT-EV does not transmit;

*i)* that for non-beam WPT-EV, the radiated RF power external to the WPT-EV system is much lower than RF power transferred to the vehicle. Most power is transferred to the receiver through mechanisms such as capacitive, resonant and inductive coupling;

*j)* 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. These limits do not necessarily protect radiocommunication services,

*noting*

[USA Note (not for inclusion): It is common to refer to appropriate international standards. The standards referenced are all now published. The date of the publications is inconsequential. If future standards are relevant then these can be referenced in the future. For that reason, the editors note below can be removed.]

*a)* that the IEC TC 69 published IEC International Standard (IS) 61980-1 on ‘general requirement of electric vehicle wireless power transfer systems’, IEC IS 61980-2 on ‘specific requirements for communication between electric road vehicle (EV) and infrastructure’, and IEC IS 61980-3 on ‘specific requirements for the magnetic field power transfer systems of WPT-EV’;

*b)* that the International Organization for Standardization (ISO/TC22/SC37) published ISO International Standard (IS) 19363 on ‘electrically propelled road vehicles – magnetic field wireless power transfer’;

*c)* that SAE International published the Standard J2954 on ‘wireless power transfer for light-duty plug-in/electric vehicles and alignment methodology’;

*d)* that issues of non-ionizing radiation exposure are dealt with by international organizations such as the WHO, ICNIRP, IEC TC106, and ICES;

*e)* and that ICNIRP 2010 provides guidelines for limiting exposure from 1 Hz to 100 kHz, ICNIRP 2020 provides guidelines for limiting exposure from 100 kHz to 300 GHz, and IEEE C95.1 provides a Standard for limiting exposure from 0 Hz to 300 GHz,

*recommends*

**1** that the use of the frequency range, or portions thereof, listed in Table 1 below should be considered as guidance for the operation of non-beam WPT-EV systems;

**2** that the following Note is considered as integral part of this Recommendation.

NOTE – Additional guidance can be found in Table 1 on necessary steps that should be taken to ensure that non-beam WPT-EV applications and equipment minimize the potential for harmful interference to radiocommunication services including the standard frequency and time signal service (SFTS) and the radio astronomy service, so that these remain protected from radio frequency energy emanating from WPT-EVfalling into all bands.

TABLE 1

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

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| --- | --- |
| **Frequency range** | **Suitable non-beam WPT-EV** |
| 19-21 kHz | Magnetic induction technology or Magnetic resonant technology  |
| 22-25 kHz | Magnetic resonant technology |
| 55-57 kHz(1) | Magnetic induction technology or Magnetic resonant technology  |
| 63-65 kHz(1) | Magnetic induction technology or Magnetic resonant technology  |
| 79-90 kHz | Magnetic resonant technology  |
| (1) Not to be used for the fundamental frequency of WPT-EV. Assuming a minimum separation distance of 50 m between WPT-EV and SFTS receivers, the third harmonic must fall within the 64-65 kHz and 55‑56 kHz frequency range and the WPT emission be limited to 35 dBµA/m at 10 m. Where a separation distance of greater than 100 m between WPT-EV and SFTS receivers can be guaranteed, the third harmonic may fall within the 63-65 kHz and 55‑57 kHz and the WPT emission be limited to 44 dBµA/m at 10 m. |
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