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DRAFT CEPT BRIEF ON AGENDA ITEM 9.1 – Issue 9.1.6 – ResolutioN 958 (WRC-15)

Resolution 958 (WRC-15) - Urgent studies required in preparation for WRC-19 - Studies concerning Wireless Power Transmission for electric vehicles

# ISSUE

Resolution 958 (WRC-15) calls to complete ITU-R studies concerning Wireless Power Transmission (WPT) for electric vehicles (EV):

* 1. to assess the impact of WPT for electric vehicles on radiocommunication services;
	2. to study suitable harmonized frequency ranges which would minimize the impact on radiocommunication services from WPT for electrical vehicles.

# Preliminary CEPT position

CEPT supports studies concerning Wireless Power Transmission (WPT) for electric vehicles (EV) to assess the impact of WPT for EV on radiocommunication services.

CEPT will consider only those potential candidate band(s) as suitable for WPT for EV, which minimise the impact of WPT for EV on radiocommunication services.

CEPT is of the view that no further regulatory action to the RR will be required.

# Background

Several frequencies are under consideration for generic WPT applications (including WPT for EV), namely: 19-21 kHz; 59-61 kHz; 79-90 kHz and 100-300 kHz.

It needs to be noted that WPT for EV requires far higher power levels as for general WPT applications dedicated to charge batteries of user equipment (e.g. watches or mobile devices). Therefore concerns were raised at WRC-15 that WPT for EV may cause harmful interference to radiocommunication services depending on the frequency band used. There was unanimous agreement at WRC-15 that WPT for EV itself is not considered as a radiocommunication service. Due to the increase of the number of electric vehicles, WRC-15 agreed that the issue needs to be studied with urgency until WRC-19.

When considering the matter CEPT took account of the current results of standardisation activities on WPT technologies for electric vehicles in relevant international fora, like the International Electrotechnical Commission (IEC), the International Organization for Standardization (ISO), the Society of Automotive Engineers (SAE), and the European Telecommunication Standardisation Institute (ETSI).

CEPT notes that several frequency bands have been made available for WPT for EV in some countries in Region 3, such as 19‑21 kHz and 59‑61 kHz for the shaped magnetic field resonance technology in Korea and 79‑90 kHz for magnetic resonant technology in Japan. It is also observed that SAE International J2954™ Task Force agreed on the band 81.38-90.00 kHz for light duty vehicle WPT and ETSI worked on “Wireless Power Transmission (WPT) systems for EV operating in the frequency band 79-90 kHz”.

ETSI also developed a new harmonised standard (EN 303 417) for “Wireless power transmission using technologies other than radio frequency beam in 19-21 kHz; 59-61 kHz; 79-90 kHz; 100-300 kHz; 6 765-6 795 kHz”. However, this harmonised standard is not only on WPT for EV. It covers all kinds of WPT applications.

Based on this, the main band under consideration for WPT for EV is 79-90 kHz, which is used in CEPT to transmit standard frequency and time signal (see FN 5.56).

WP 1B focuses its studies on frequency ranges for generic WPT applications including WPT for EV applications.

# List of relevant documents

* Report ITU-R SM.2303-1, Wireless power transmission using technologies other than radio frequency beam
* ITU-R Resolution 705 (Rev.WRC-15), Mutual protection of radio services operating in the frequency band 70-130 kHz
* ETSI TR 103 409, System Reference document (SRdoc); Wireless Power Transmission (WPT) systems for Electric Vehicles (EV) operating in the frequency band 79-90 kHz
* ETSI EN 303 417, Wireless power transmission using technologies other than radio frequency beam in the 19-21 kHz, 59-61 kHz, 79-90 kHz, 100-300 kHz, 6 765-6 795 kHz ranges
* Annex 4 to Document 1B/260 Working document towards a preliminary draft revision on Recommendation ITU-R SM.2110-0 Frequency ranges for operation of non-beam wireless
power transmission systems
* Working Document towards a preliminary draft new Report ITU-R SM.[WPT.SPEC.MNGM]; Methodology for spectrum management of wireless power transmission (WPT) .
* ITU-R Question 210/3-1 [‘Wireless power transmission’](http://www.itu.int/pub/R-QUE-SG01.210)

# Actions to be taken

CEPT has identified the following study issues which require clarification:

Definition of electric vehicle,

WPT Mechanisms,

Regulatory basis for WPT,

Power level categories and aggregation.

Consider the result of studies to be conducted by SE24 in the context of Agenda item 9.1 - Issue 9.1.6.

Contributions on the issues identified for clarification should be submitted to ITU-R WP 1B.

The basis for potential interference from high-power WPT devices shall be assessed taking account of high density usage and realistic growth in EV.

In addition:

In cooperation with SE24, consider undertaking modelling or practical measurements for high density multiple WPT usage scenarios.

CEPT PTD may also wish to liaise with WGFM/SRD-MG regarding the development of a specific Annex to CEPT Recommendation 70-03 for WPT applications.

To develop a draft ECP NOC

# Relevant information from outside CEPT (examples of these are below)

## European Union (date of proposal)

## Regional telecommunication organisations

APT (21 July 2017)

APT Members support the studies carried out by ITU-R in accordance with Resolution 958 (WRC‑15) to assess the impacts of WPT for electric vehicles on radiocommunication services and to study suitable harmonized frequency ranges which would minimize the impact on radiocommunication services from WPT for electrical vehicles.

A Working document towards a draft new APT report on frequency ranges used for non-beam WPT for electric vehicles has been recently updated by APT which contains information on EV applications and technologies, Standardization status, National regulations on WPT for EV application in some APT member countries, Frequency Bands Studies for WPT in Some APT Member Countries and Status of studies on the impact of WPT EV to the incumbent systems in some APT member countries.

This doesn’t provide the position of APT on the Agenda item 9.1 - Issue 9.1.6. It has already been submitted to WP 1B for consideration at the June 2017 meeting in the studies on WPT as document WP1B-0143 (<https://www.itu.int/md/R15-WP1B-C/en>). It is scheduled to be finished in the next AWG meeting (AWG-22) which will be held in September 2017.

ATU (date of proposal)

Arab Group (ASMG) (20 April 2017)

* Follow up and support the current studies to assess the impact of (WPT) for electric vehicles on radiocommunication services; and to study suitable harmonized frequency ranges which would minimize the impact on radiocommunication services from (WPT) for electrical vehicles.
* Ensure the protection of the incumbent services and not add any additional constraints on these services.
* Request ASMG administrations to identify their current and future uses in the frequency bands proposed in order to ensure the protection of these services in these bands.

CITEL (date of proposal)

RCC (14 April 2017)

The RCC Administrations are in favour of harmonizing frequency bands to be used for Wireless Power Transmission (WPT) for electric vehicles, which could be implemented by the development of relevant Recommendation ITU-R.

The RCC Administrations support the development of conditions for use of the frequency bands 19‑21 kHz, 59‑61 kHz, 79‑90 kHz and 100‑300 kHz by WPT devices, which would provide protection to stations of radiocommunication services from possible interference, and which have relevant allocations in the Radio Regulations on a primary or secondary basis.

The RCC Administrations do not oppose harmonizing the frequency band 6 765‑6 795 kHz for WPT devices.

## International organisations

NATO (27 June 2017)

This NATO military assessment summary is a common military assessment of the NATO Nations on the potential impacts and benefits of Agenda Item 9.1 Issue 9.1.6. It does not constitute a common position of the NATO Nations.

As candidate frequency bands or individual frequencies for WPT applications are 19-21 kHz, 59-61 kHz, 79-90 kHz and 100-300 kHz under discussion.

The range 14-148.5 kHz is a NATO harmonised band and essential to NATO and is in military use for naval communications and tactical non-directional beacons.

From a military perspective, studies will need to show compatibility with applications of the existing services and that the introduction of WPT systems for electric vehicles has no harmful impact on military usage.

IATA (date of proposal)

ICAO (12 September 2017)

To ensure that the protection of aeronautical systems is appropriately taken into account during the studies called for in response to Resolution 958 (WRC-15).

IMO (date of proposal)

IARU (April 2017)

IARU observes that the High Power Wireless Power Transfer (HPWPT) is an emerging technology which will in time become deployed on a widespread basis (one in every house). IARU further observes the on-going work in ITU and standards organisations to propose frequency ranges for HPWPT. IARU is of the view that radio frequency emissions resulting from any kind of Wireless Power Transmission (WPT) must be confined to the frequency ranges already identified for equipment used for industrial, scientific, and medical (ISM) applications or if found necessary, to frequencies below 100 kHz.

Since HPWPT involves very large amounts of RF power and an HPWPT installation involve components connected together in a system with associated power supplies and control equipment, the spurious emissions from all these system parts must be carefully controlled in order to avoid degrading the radio spectrum and cause interference to other radiocommunication systems or services in accordance with RR 15.12 and RR 15.13.

Sources of emissions on frequencies other than the fundamental frequency of the HPWPT include:

* High order harmonics of the fundamental WPT frequency;
* Phase noise from the frequency control circuits (“jitter”) causing wideband noise;
* Spurious signals form the switch-mode power supply on all control and power ports – conducted and common mode;
* Common mode signals on control cables and power lines from data communication networks associated with the control of the unit.
* To ensure adequate protection to authorised radio services, proper compatibility and sharing studies should be conducted.

IARU regards cooperation between ITU and Standards organisations to be essential in the evolution of standards and frequencies for HPWPT operation.

SFCG (June 2016)

While past work on the topic of WPT for electric vehicles has focused on bands below 400 kHz, and in the 6 765-6 795 kHz band, Resolution 958 (WRC-15) does not limit the studies to those bands. SFCG should continue to monitor the developments of this agenda item for any spectrum requirements identified that could impact space science services operations.

WMO and EUMETNET (8 February 2017)

WMO/EUMETNET does not oppose to study suitable harmonized frequency ranges for WPT provided that it does not impact operation of lightning detection networks operating in the 20-350 kHz range and oceanographic radars operating in the 5250-5275 kHz frequency band.

## Regional organisations

ESA (28 November 2016)

ESA supports the SFCG position.

Eurocontrol (date of proposal)

## OTHER INTERNATIONAL AND REGIONAL ORGANISATIONS

EBU (9 March 2017)

EBU members operate amplitude modulation broadcasting stations in the MF, LF and HF bands. Initial studies show the possibility of interference to those stations because of harmonic emissions from WPT devices. Any use of WPT devices needs to be sufficiently regulated in order to limit such emissions to levels which will not cause harmful interference to the broadcasting service.

Furthermore, the EBU has not seen any explanation about why a frequency range is required for WPT for electric vehicles. The EBU urges that spot frequencies only be used for WPT.

GSMA (date of proposal)

CRAF (date of proposal)