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Wireless power transfer – Management –
Part 2: Multiple device control management

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

WIRELESS POWER TRANSFER – MANAGEMENT –

Part 2: Multiple device control management

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FDIS	Report on voting
100/2900/FDIS	100/2939/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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INTRODUCTION

The IEC 62827 (Wireless Power Transfer – Management) series provides the management protocol for a wireless power transfer system in which power sources can deliver power to receivers at a distance. The IEC 62827 series consists of the following parts:

- Part 1: Common components
- Part 2: Multiple device control management
- Part 3: Multiple source control management

Part 1 of IEC 62827 defines the definition and functionality for wireless power transfer systems.

Part 2 of IEC 62827 specifies the management protocol of wireless power transfer for multiple devices.

Part 3 of IEC 62827 specifies the management protocol of wireless power transfer for multiple sources.

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WIRELESS POWER TRANSFER – MANAGEMENT –

Part 2: Multiple device control management

1 Scope

This part of IEC 62827 defines a wireless power management protocol for wireless power transfer to multiple devices in a wireless power management system. Various functions of wireless power management systems are justified. The wireless power management frames and messages that work between the management block of a power source and the management block or the coupler block of a device, or the coupler block of a power source, are defined as well to execute various functions. Also, the procedures for each functionality are described based on its frames and messages.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62827-1, *Wireless power transfer – Management – Part 1: Common components*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions given in IEC 62827-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Definitions

3.1.1

COM ID

ID which is allocated to power a receiver within the wireless data communication zone of the wireless power source

3.1.2

wireless data communication zone

area where a wireless power source can transfer data to wireless power receivers without physical contact

3.1.3

wireless power management frame

format of the data which is exchanged between a wireless power source and a wireless power receiver

3.1.4**wireless power management message**

data which is exchanged between a wireless power source and a wireless power receiver

3.1.5**wireless power management protocol**

set of rules which determines how a wireless power source communicates with wireless power receivers in the wireless power management system

3.1.6**wireless power management system**

management system that is capable of transferring electric power from either one or multiple wireless power source(s) to either one or multiple wireless power device(s) with wireless communication

Note 1 to entry: In the event that areas or regions, where both data and power can be transferred, are emphasized, the term “Wireless Power Transfer Network” may be used.

3.1.7**wireless power management system**

<device> wireless power receiver that can receive electric power from wireless power sources

3.1.8**wireless power management system**

<repeater> wireless power relay transmitter that can transfer electric power from one or multiple wireless power source(s) to one or multiple wireless power receiver(s)

3.1.9**wireless power management system**

<source> wireless power source that can transfer electric power to a number of wireless power receivers or relay transmitters

3.1.10**wireless power receiver**

device that receives electric power wirelessly

3.1.11**wireless power source**

transmitter that delivers electric power to power receiver

3.1.12**wireless power transfer**

transfer of electric power without the physical contact of electrodes

3.1.13**wireless power transfer system**

system that wirelessly transfers electric power from a wireless power source to a wireless power receiver

3.1.14**wireless power transfer zone**

area where a wireless power source can transfer electric power to wireless power receivers without physical contact

3.1.15**WPT ID**

ID which is allocated to the device within the wireless power transfer zone of wireless power source

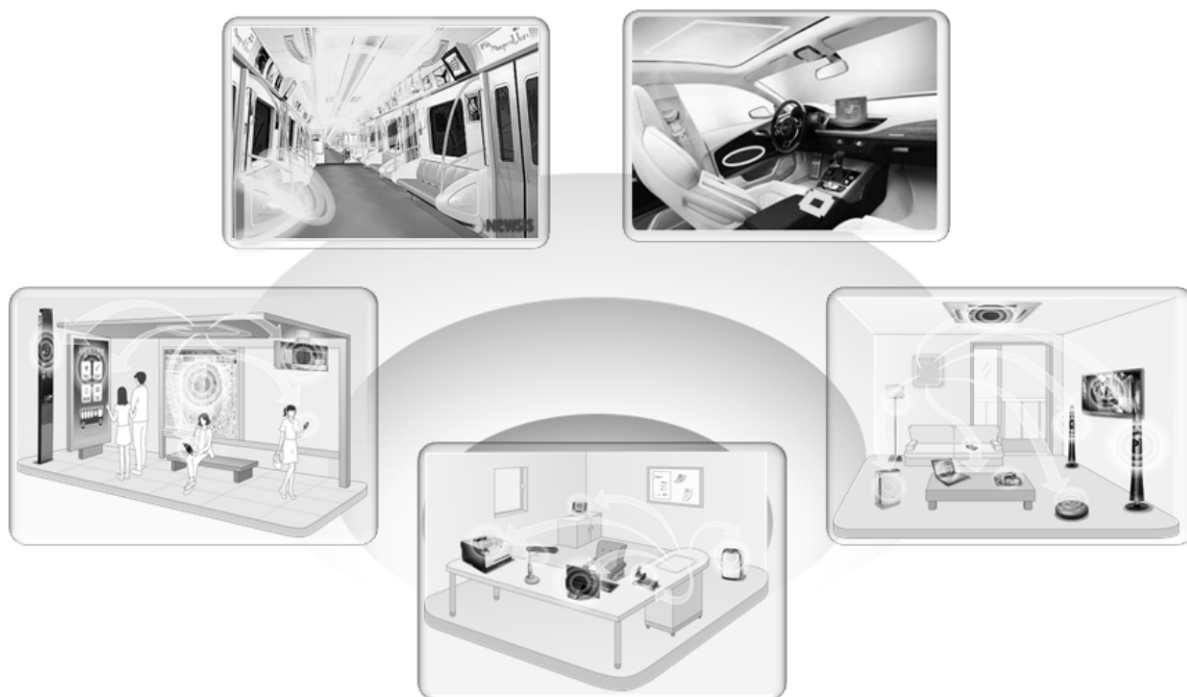
3.2 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply:

ABNR	abnormal
API	application programming interface
APP	application
DMTC	device management to coupler
DST	destination
ELGB	eligibility
MAC	medium access control
MFAN	magnetic field area network
MGMT	management
MTM	MGMT to MGMT
NFC	near field communication
PHY	physical
RFID	radio frequency identification
RSSI	received signal strength indicator
RX	receiving
RxPower	received power
SCHDL	scheduling
SMTA	source management to application
SRC	source
UCID	unique coupler ID
WDCZ	wireless data communication zone
WPMS	wireless power management system
WPMS–D	wireless power management system – device
WPMS ID	wireless power management system identification
WPMS–R	wireless power management system – repeater
WPMS–S	wireless power management system – source
WPT	wireless power transfer
WPTS	wireless power transfer system
WPTZ	wireless power transfer zone

4 Overview

WPMS, which is defined in IEC 62827-1, is a management protocol system for wireless power transfer to a number of WPMS–Ds. WPT is a technology that replaces the conventional wired charging method with wireless charging. It utilizes the characteristics of magnetic fields and electric fields to deliver power wirelessly. In the market, there are a large number of wireless charging devices, designed under various kinds of protocols, which are not interoperable. The inconvenience it causes to users could cost an unnecessary large sum of money, and uneconomical expenditure. WPMS aims to provide consumers of wireless charging devices an option to be able to fully utilize a system that is compatible with a number of existing technologies. Also, to break away from conventional 1:1 wireless charging (1:1 WPT), WPMS will be managing power transfer to multiple WPMS–Ds at a time (1:N WPT), using various WPT modes.

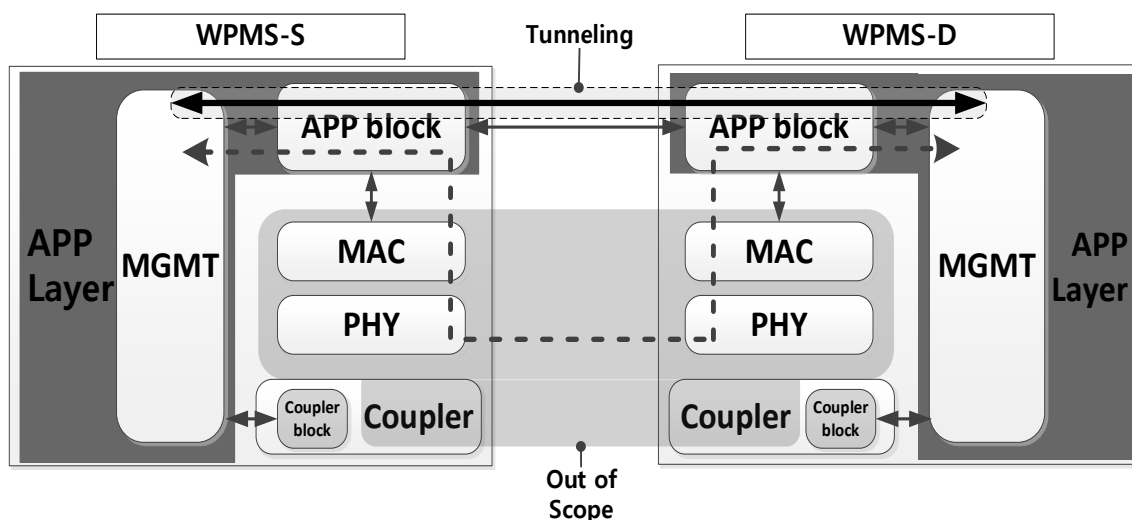


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Figure 1 – Usage examples of WPMS services

- The WPMS technology can be applied to the following industry fields, and others that require a constant power supply. WPMS services can be provided as shown in Figure 1. Mobile terminals: charging services can be provided within mobile terminals anytime and anywhere.
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- Home appliances: to make entangled cable mess neat and convenient, the use of WPMS technology can offer the benefits of minimal wiring and freedom of furniture arrangement.
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In order to provide effective WPT to multiple WPMS–Ds, a proper management protocol shall be thoroughly structured as shown in Figure 2. This protocol enables WPMS–S or WPMS–R to control WPMS–Ds for efficient WPT process, regardless of MAC and PHY types. Under the structure of WPMS, it will be able to incorporate both out-band WPT systems, which use Wi-Fi, Bluetooth, ZigBee, NFC, RFID etc., and in-band WPT systems, which use MFAN etc. The WPMS can exchange the messages between such blocks as APP block, MGMT block and coupler block. See Annex A for additional information. It shall have the system structure shown in Figure 2.



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Figure 2 – WPMS structure

In order to efficiently provide WPT services to multiple WPMS–Ds, a proper signalling system is required; it shall be incorporated for the exchange of WPT data and control signals. For the compatibility of the WPT, users may select various frequency bands for the WPT as well.

Within the WPMS's range, WPMS–Ss or WPMS–Rs can provide WPTs with several watts to several hundred watts. The closer the distance between WPMS–Ss and WPMS–Ds, the greater the efficiency becomes. As shown in Figure 1, provided that enough infrastructure is installed, an omnipresent charging environment is created.

Functions like optimal WPT mode selection are included for the best WPT efficiency. Also, the WPMS includes emergency controls that provide counter-measures to contingencies, such as sudden WPMS–D detection and disappearance. General WPT environments are controlled by WPMS–Ss, which manage connection, separation, and release of WPMS–Ds. In order to increase the efficiency of WPMS, WPTs can use in band communication which utilizes the frequency to transfer data as well as power.

5 Functionalities

5.1 General

In order to design a management protocol that can construct reliable and efficient WPTS for multiple WPMS–Ds, it needs to include all the fundamental functions, yet not repetitively. In WPMSs, there are two ways of controlling compatibility: indirect control and direct control. Also, functions are categorized into six distinctive functions. They are initialization, association, general WPT management, abnormal WPT management, inter–device WPT management, and termination.

5.2 Compatibility

5.2.1 General

There are two ways of control, depending on the compatibility with WPTS and WPMS. If WPTS does not support WPMS, WPMS will control indirectly; otherwise, it will control directly.