

Assessment on the Wireless Power Transfer Figures of Merit and Transmitter Architectures

Pedro Miguel Cruz⁽¹⁾ and Nuno Borges Carvalho⁽¹⁾

(1) Institute of Telecommunications – University of Aveiro, Campus Universitário de Santiago, 3810-193 - Aveiro, Portugal, pcruz@av.it.pt

ABSTRACT: This paper performs an assessment of available architectures and techniques for Wireless Power Transfer (WPT) transmitter blocks. In the transmitting segment of the WPT chain one of the driving components is the power amplification block, because it generally defines the capability of the system in terms of the range for the WPT link to be established, as well as, limiting or not the amount of information that can be exchanged. These facts are quite important because it is common to have WPT links that provide not only energy to the battery-less devices, but also allowing information to be exchanged between the WPT transmitter and several receivers.

Thus, this study will be focused on the linearity and efficiency metrics provided by each of the presented power amplification strategies.

DESCRIPTION: Firstly, a complete WPT chain will be briefly analyzed for the individual figures of merit of each part of the system, when considering energy and data transmission applications. This will allow the calculation of the overall system efficiency, and to demonstrate the impact of the specific transmitter block stage metrics.

Secondly, several solutions for the WPT transmitter block will be analyzed and discussed having in mind the explicit application to an energy and data WPT system.

Finally, a practical example of a WPT transmitter for the 5.8GHz band is presented, along with the conclusions and outlook of the WPT technology. The organization of the paper is as follows:

1. Introduction

2. WPT Chain Figures of Merit

2.1. DC-RF (WPT transmitter evaluation)

2.2. RF-RF (Medium or air interface evaluation)

2.3. RF-DC (RF-DC conversion or receiver evaluation)

2.4. Overall System Efficiency

3. WPT Transmitter Architectures and Techniques

(WPT transmitting architectures and its advantages or disadvantages; Techniques to improve the performance – waveform design, etc.)

4. Practical Examples

(Practical example of a WPT transmitter, by analyzing the metrics of a 5.8GHz power amplifier for WPT applications).

5. Summary and Outlook