A Technical Review: Wireless Information and Power Transfer in OFDM

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ABSTRACT

Wireless information and power transfer (WIPT) is promising solution for to maximize data rates and energy perception. The objective of this work is to select appropriate design for wireless information and power transfer (WIPT) in orthogonal frequency division multiplexing (OFDM) based system. Different methods for wireless information and power transfer is also studied. For this multiple access methods considered are time division multiple access (TDMA) and orthogonal frequency division multiplexing access (OFDMA). The project work is to stimulate wireless simultaneous information and power transfer in TDMA and OFDMA.

Key Words: -*Wireless information and power transfer (WIPT), time division multiple access (TDMA), Orthogonal Frequency Division Multiplexing (OFDM), orthogonal frequency division multiplexing access (OFDMA)*

1. INTRODUCTION

With the growth of wireless communication, bandwidth and power requirement is also increased so research is ongoing in simultaneous information and power transfer since past decade to solve this problem. Simultaneous wireless information and power transfer is not an easy task because data rates should not be compromised for energy harvesting. In practical still circuits can't perform harvesting Energy and decode information directly from same signal. Orthogonal Frequency Division Multiplexing (OFDM) is a multiple access method which provides high data rate with reduced inter symbol interface but it has a problem of high peak to average power ratio and its sensitivity to phase noise.

2. REVIEW OF PAPERS

A. L. R. Varshney, "Transporting information and energy simultaneously," in Proc. IEEE Int. Symp. Inf. Theory (ISIT), pp. 1612-1616, July 2008.

First idea of transmitting information and energy simultaneously is proposed by Varshney. With assumption that the receiver can decode information and harvest energy simultaneously from the same

received signal but this assumption is wrong in practice, because circuits are not able to harvest energy and decode the carried information directly from radio signals. [1]

B. *Xun Zhou, Rui Zhang, Chin Keong Ho "Wireless Information and Power Transfer in Multiuser OFDM Systems" IEEE Global Communications Conference, December 9-13, 2013, Atlanta, USA*

This paper concludes the excellent design for simultaneous wireless information and power transfer in downlink multiuser orthogonal frequency division multiplexing systems. In this fixed access point is provided to users for harvesting energy and decoding information from common received signals. For the TDMA-based information transmission, time switching technique is used at the receivers; for the OFDMA-based information transmission, power splitting technique is used at the receivers. [2]

C. *R. Zhang and C. K. Ho, "MIMO broadcasting for simultaneous wireless information and power transfer," IEEE Trans. Wireless Commun., vol. 12, no. 5, pp. 1989-2001, May 2013.*

This paper discuss a multiple-input multiple-output wireless broadcast system with three nodes, in which one receiver is used for harvests energy and another receiver is used for decodes information separately from the signals sent by a transmitter, and all the transmitter and receivers can use multiple antennas. This paper gives practical designs for two case, namely time switching and power splitting. Comparison of both cases is also done for their achievable R-E regions for the outer bound. This paper shows that unlike the past views that the receiver noise and/or co-channel interference degrade the performance of communication link, they are beneficial for RF energy harvesting. [3]

D. *L. Liu, R. Zhang, and K. C. Chua, "Wireless information and power transfer: a dynamic power splitting approach," IEEE Trans. Commun., vol. 61, no. 9, pp. 3990-4001, Sep. 2013.*

This paper shows simultaneous wireless information and power transfer via the approach of dynamic power splitting. It shows the optimal power splitting rule at the receiver based on the Channel State Information to optimize the rate energy performance trade-off under a point-to point flat-fading SISO channel setup. Furthermore, work is extended for the DPS scheme to the SIMO system with multiple receiving antennas which shows that a uniform power splitting scheme is optimal. [4]

E. *K. Huang and E. G. Larsson, "Simultaneous information and power transfer for broadband wireless systems," IEEE Trans. Signal Process, vol. 61, no. 23, pp. 5972-5986, Dec. 2013.*

This paper proposed an optimized algorithms which gives maximizing the system throughput for circuit-power constraints at mobiles, in addition to a power constraint at the base station. Simulation shows that for enhancing the efficiency of SWIPT power control plays an important role. [5]

3. SUMMARY OF LITERATURE REVIEW

With the rapid growth of wireless communication technologies, the Simultaneous wireless information and power transfer's requirements keeps on increasing with each iteration of the technology. For this problem may algorithms and ideas are proposed but none is able to give us optimize solution .Here, we propose a two scheme time switching and power splitting according to the power and data rate requirement and tried to obtain optimize solution for it.

The work so far suggest that algorithm proposed in base paper is helpful and able to solve the problem specified in objective.

4. REFERENCES

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