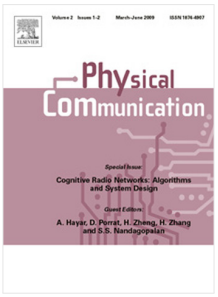
Accepted Manuscript



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PII: S1874-4907(17)30081-2
DOI: http://dx.doi.org/10.1016/j.phycom.2017.07.003
Reference: PHYCOM 405

To appear in: *Physical Communication*

Received date : 17 March 2017
Revised date : 17 June 2017
Accepted date : 17 July 2017

Please cite this article as: M.R. Bharti, D. Ghosh, Spectrum efficient power allocation schemes for OFDM cognitive radio with statistical interference constraints, *Physical Communication* (2017), http://dx.doi.org/10.1016/j.phycom.2017.07.003

Spectrum Efficient Power Allocation Schemes for OFDM Cognitive Radio with Statistical Interference Constraints

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Abstract

In this paper, we study the power allocation problem for an orthogonal frequency division multiplexing (OFDM)-based cognitive radio (CR) system. In a departure from the conventional power allocation schemes available in the literature for OFDM-based CR, we propose power allocation schemes that are augmented with spectral shaping. Active interference cancellation (AIC) is an effective spectral shaping technique for OFDM-based systems. Therefore, in particular, we propose AIC-based optimal and suboptimal power allocation schemes that aim to maximize the downlink transmission capacity of an OFDM-based CR system operating opportunistically within the licensed primary users (PUs) radio spectrum in an overlay approach. Since the CR transmitter may not have the perfect knowledge about the instantaneous channel quality between itself and the active PUs, the interference constraints imposed by each of the PUs are met in a statistical sense. We also study an optimal power allocation scheme that is augmented with raised cosine (RC) windowing-based spectral shaping. For a given power budget at the CR transmitter and the prescribed statistical interference constraints by the PUs, we demonstrate that although the on-the-run computational complexity of the proposed AIC-based optimal power allocation

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