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An application of Learning Automata Based ARL to Subchannel Allocation in Cellular OFDMA System

Publisher: IEEE

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Abstract:
In this paper, a new subchannel allocation schemes for cellular OFDMA networks employing an adaptive frequency reuse factor (FRF) strategy is considered. The allocation algorithm is semi-distributed solution comprising two phases. In the first phase, the Radio Network Controller (RNC) adaptively determines the FRF of each subchannel in a centralized manner. In the second phase, each base station autonomously allocates subchannels to the users using a simple algorithm (i.e. MaxC/I). To solve the first phase, we introduce a hybrid associative reinforcement learning (ARL) model combining self organizing map (SOM) and Learning Automata (LA) to deal with large size and continuous nature of the problem space. The simulation results illustrate that the proposed model achieves a better throughput gain in comparison with other allocation algorithms. It is noteworthy that the proposed algorithm has a low computational cost and achieving this throughput gain is only due to proper assignment of FRF to subchannels.

Published in: 2008 3rd International Conference on Information and Communication Technologies: From Theory to Applications

Date of Conference: 7-11 April 2008   **INSPEC Accession Number:** 10053393

Date Added to IEEE *Xplore*: 23 May 2008   **DOI:** 10.1109/ICTTA.2008.4530236

ISBN Information: **Publisher:** IEEE

                                                 Conference Location: Damascus, Syria

Contents

I. Introduction
Orthogonal frequency division multiple access(OFDMA) system have been proposed to provide high data rate transmission in wireless communication [1]. Since the total bandwidth given to an OFDMA system