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GENETIC ALGORITHM-BASED DYNAMIC CHANNEL ALLOCATION TO MINIMIZE THE INTER-CELL INTERFERENCE IN DOWNLINK WIRELESS COMMUNICATION SYSTEMS

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Abstract. *This paper deals with an efficient dynamic channel allocation (DCA) playing the role of dynamic inter-cell interference coordination (ICIC) in wireless communication system using orthogonal frequency division multiple access (OFDMA) with a frequency reuse of 1. In such a system, the system performance is limited by inter-cell interference (ICI). The goal of our paper is to maximize throughput and minimize outage at the same time by seeking optimal channel allocation for a new call with the aim of minimizing interference to an existing call due to channel allocation for a new call. To achieve the goal, the DCA scheme has to find the best combination from all calls, channels and cells when new call requests channel allocation. However, it needs exponential search spaces and becomes a NP-hard problem. Thus, we use one of the heuristic algorithms, genetic algorithm (GA), and conclusively propose the GA based DCA scheme. Simulations results show that the proposed GA-based DCA scheme outperforms the existing schemes in terms of throughput and outage probability not only in the entire cell but also at the cell edge.*

Keywords: Dynamic channel allocation, Genetic algorithm, Inter-cell interference coordination, Inter-cell interference, Grade of service

1. **Introduction.** Orthogonal frequency division multiple access (OFDMA) is the proposed modulation and multiple access method for 3GPP long term evolution (LTE) and WiMAX 802.16e since the intrinsic characteristic of channel orthogonality. However, although there is no intra-cell interference inside a single cell in the OFDMA systems, inter-cell interference (ICI) due to frequency reuse is an important issue that needs to be resolved for the implementation and deployment of the OFDMA systems. As the ICI increases, outage probability at the cell edge increases. Therefore, inter-cell interference coordination (ICIC) is needed to minimize ICI and is used to cope with ICI [1-3]. ICIC is based on the concept that a well-designed coordination of resource among users in adjacent cells can reduce ICI.

The dynamic channel allocation (DCA) playing the role of ICIC can become one solution to accomplish the goal of this paper that minimizes outage probability and maximizes throughput with ICI consideration at the same time. However, if it is tried to achieve the goal of this paper by channel allocation for a new call, existing calls at the cell boundary can experience serious ICI. As a result, the ICI increases existing call termination, so the DCA scheme should minimize ICI by considering interference change to existing calls whenever channel for a new call is allocated. Therefore, the DCA problem has been proved to be NP hard [4-7] since it needs exponential search spaces to seek the best combination