A Dynamic Q-Learning-Based Scheduler Technique for LTE-Advanced Technologies Using Neural Networks

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Abstract:

The tradeoff concept between system capacity and user fairness attracts a big interest in LTE-Advanced resource allocation strategies. The network throughput performance can be increased by exploiting the multiuser diversity. However, this solution will lead to impaired fairness between users. By using static threshold values for throughput or fairness, regardless the network conditions, makes the scheduler to be inflexible when different tradeoff levels are required by the system. This paper proposes a novel dynamic Q-learning-based scheduling technique that achieves throughput-fairness tradeoff by offering a dynamic compromise between t hem according to the Channel Quality Distribution (CQD) for different classes of users. The Q learning algorithm is used to adopt different policies of scheduling rules, at each transmission time interval (TTI), reaching optimal values even in the exploration stage. The novel scheduling technique makes use of neural networks in order to reduce the learning period and hence improving the performance of the overall system. Simulation results indicate that the novel proposed method outperforms the existing scheduling techniques by maximizing the system throughput, user fairness, cell spectral efficiency and cell-edge spectral efficiency. Moreover, the system achieves a desired throughput-fairness tradeoff and a global satisfaction for different classes of users.