Abstract

In this thesis, traditional fair channel access algorithms are presented and evaluated. The distinction between contentious and non-contentious scheduling algorithms is made and the non-contentious algorithms are chosen as the focus of the research. This is due to the issue of lengthy delays associated with providing fair non-contentious scheduling in multimedia cellular networks. Also of interest is that these algorithms are not as extensively researched as the contentious algorithms. However, the contentious Distributed Coordination Function (DCF) algorithm protocol used in one of the IEEE 802.11 MAC will also be briefly discussed. The research will highlight that various algorithms have different definitions of 'fair'. Moreover, it will be shown that these algorithms are neither fair nor suitable for usage in multimedia cellular networks. Fairness for such networks will be defined before the introduction of the novel Delay Weighted Priority Scheduling (DWPS) Algorithm. The novel algorithm will employ application based prioritisation and assign a calculated delay counter to determine which mobile station will be assigned to the vacant channel. Simulation results will confirm that the DWPS algorithm meets its fairness criteria and performs better than the round-robin and random selection algorithms under identical conditions. However, during heavy traffic conditions quality of service degradation will occur for delay sensitive applications due to lengthy queues.

Keywords: Fair Channel Access Algorithms, Cellular Networks, Delay Tolerance Threshold, Delay Weighted Priority Scheduling, Quality of Service (QoS), Incidence of QoS Degradation, QoS Tolerance Threshold, Ready Ratio.