

## ABSTRACT

In the world of broadband telecommunication, LTE is still a hot issue and considered to be idea of research for its development. One of the issues related to LTE development is the utilization of multiuser diversity. Multiuser diversity is the diversity of channel condition arising from the users. Multiuser diversity issue can be used to increase the system capacity, that is to allocate the radio resources well.

In this final assignment, the usage of Ant Colony Optimization (ACO) algorithm for radio resources allocation in downlink LTE system is observed. ACO is metaheuristic algorithm that works based on ants' activity. These ants utilize the information of pheromones and heuristic values. Every ant moves in parallel condition to build the solution of resource block (RB) allocation for the users. Furthermore, these solutions will be evaluated by using a specific objective function.

Simulation of RB allocation is done using two scenarios, that is variation of iteration number and number of ants. From the simulation results, it's obtained that the increasing number of iteration can improve the average user throughput by 0.05%. The increasing number of ants can also enhance the average user throughput, but the improvement of average user throughput only takes effect in number of ants with range 10-30 ants. This is because the constant number of iteration, that is 50 times, is enough to yield the good-quality solution. Beside that, ACO is capable of making a good performance of fairness for two scenarios, that is 0,9998 or 99.98% fair. This is because ACO can allocate RBs to all users fairly. Meanwhile, in time complexity, ACO has a higher time complexity compared to conventional algorithm, such as proportional fair (PF). The important variables, such as the number of iteration and ants, just increase the time complexity of the RB allocation process. But, on the other side, these two variables can be quantified so that its complexity is reduced and equal to PF.

**Keywords:** LTE, ant colony optimization, resource block, allocation