

ABSTRACT

Science is currently experiencing very rapid development. Especially in the telecommunications sector. Where cellular communication has undergone many generations of changes starting from the first generation which is commonly called *1G* to the 5th generation which is commonly called *5G*. The rapid development in the field of telecommunications makes activities easier and causes the number of cellular users to increase. Along with the increase in cellular users, it can lead to a rapid increase in data networks. In increasing mobile users D2D communication has a basic problem, namely interference between cellular not allocated properly. If the intercellular interference is not controlled properly, then D2D communication can damage the quality of user communication other.

In this final project, research is carried out to overcome interference problems in the *downlink* transmission direction with a D2D *underlay* communication system. Where in this study using two scenarios and two algorithms as the allocation of *resources*. In the first scenario, we vary the number of pairs of DUE by comparing the *graph coloring* and *greedy* algorithms and in the second scenario, we vary the *radius cell* by comparing the *graph coloring* algorithm and the *greedy* algorithm

Based on the simulation results that have been carried out, the best results are obtained in the second scenario using the *radius variation cell* and in the second scenario the sumrate value is 90.0248 Mbps, *efficiency power* 4346.0646 bps/mW, *efficiency spectral* 10.0027 bps /Hz, *fairness CU* 0.8650, *fairness DU* 0.8686, and *fairness* totals 0.8395.

Keyword : *Device-To-Device, radius cell, rgreedy, graph coloring*