ABSTRACT

The number of mobile users continues to increase every year. The increase in the number of users will also increase the workload of the *Base Station* (BS). One of the existing solutions is *Device To Device* (D2D) communication. D2D allows direct mobile communication between neighboring devices without going through the BS directly. However, this technology has some disadvantages, one of which is related to interference that occurs because the *Celluler User* (CU) and *D2D User* (DU) use the same resources.

This final project proposes to use cluster-oriented resource selection in *downlink* communication with 2 scenarios, namely scenario 1 by changing the number of DU and scenario 2 by changing the *cell* radius. The goal is to minimize interference, maximize *sumrate*, power efficiency, spectrum efficiency, and *fairness* while keeping mobile users performance in mind. The *Greedy* Algorithm, 8 *Clustering* Algorithm, and 4 *Clustering* Algorithm are used to compare resource allocation results to determine which algorithm is superior in resource allocation in the *underlay* communication.

Based on the simulation results, 8 clustering algorithm and 4 clustering algorithm did not have big impact to increase *sumrate*, power efficiency, spectrum efficiency, *fairness* CU, *fairness* DU, and total *fairness*. In scenario 1, the *greedy* algorithm is better than the 8 *clustering* algorithm and the 4 *clustering* algorithm for the *sumrate* parameter with a value of 1.64708 $\times 10^8$ bps, power efficiency with a value of 3326.49 bps/mWatt, spectral efficiency with a value of 9.1504 bps/Hz, *fairness* CU with a value of 0.4411, *fairness* DU with a value of 0.92076 and total *fairness* with a value of 0.5430. In scenario 2, the 8 *clustering* algorithm obtains a *fairness* DU that surpasses the *greedy* algorithm with a value of 0.914063. For other parameters, *greedy* algorithm is better than 8 *clustering* algorithm and 4 clustering algorithm.

Keyword : *device to device*, *greedy algorithm*, *8 clustering algorithm*, *4 clustering algorithm*, *resource allocation*