

## ABSTRACT

Developments and needs in technology in the telecommunications sector are increasing. One technology that can have a major effect on service quality and can be developed is Device-to-Device (D2D) communication. In D2D communication systems can serve data transfers between users without going through a Base Station (BS). The resource used on the D2D communication system is the same as the resource used on the Cellular User (CU).

This research discusses the allocation of resource blocks (RB) and the allocation of power to improve the energy efficiency of D2D communication in cellular networks. This final project simulation is done using Greedy and Mean Greedy algorithms to allocate RB to users. In achieving optimal power the Inverse Waterfilling (IWF) scheme based on the Relaxation algorithm is used.

The results of the allocation scheme testing using Greedy IWF based on Relaxation algorithm give better performance at the data rate with an average value of  $3.4474 \times 10^6$  bps better 87.95% from Greedy EPA 99.95% from Mean Greedy EPA 28.69% of Mean Greedy IWF based Relaxation algorithm, energy efficiency with an average value of  $0.2084 \times 10^6$  bps / W better 88.59% from Greedy EPA 100% from Mean Greedy EPA 28.88% than Mean Greedy IWF based Relaxation algorithm, efficiency spectral with an average value of 1.7623 bps / Hz 88.14% better than Greedy EPA 101% from Mean Greedy EPA 28.39% from Mean Greedy IWF based Relaxation algorithm, fairness with an average value of 0.4602. On testing secondly, by analyzing the IWF scheme based on Relaxation algorithm in Greedy and Mean Greedy, the value of data rate, energy efficiency, spectral efficiency, and fairness are better at the power limit of 0.5 Watt.

**Keywords :** Greedy, Mean Greedy, Inverse Waterfilling, D2D