ABSTRACT

Cellular technology is growing both in terms of data speed, data capacity and even network services provided to help and facilitate human work. The development of cellular technology has now entered the 4th generation (4G) era and in 2018 the 5th generation (5G) cellular network has been developed. In its development, the 5th generation network (5G) requires new architecture, device technology, and algorithms to handle the increasing demand for wireless network services, low latency, low power usage, and higher data rate speeds. One application of communication from the 5G network in the future is to implement Device to Device (D2D) into heterogeneous multi-tiered communication networks consisting of small cell communications between eNB, cellular, and D2D.

D2D was developed because it can connect directly between devices with other devices without going through the Base Transceiver Station (BTS) and works as an off-load Evolved Node B (eNB). The application of D2D is very useful for the future even though it has several problems with one of them being interference with the frequency of other devices in the same cell. This can affect Quality of Service (QoS) in D2D communication so that it requires the application of a resource allocation distribution that can increase spectral efficiency, data rate, and reduce interference. One of the algorithms used for resource allocation distribution in communication network systems is the Auction allocation algorithm.

The auction allocation algorithm in this final assignment provides a solution to divide Iresource fairly to D2D pairs with an average fairness value of 0.67525. The system data rate increases by increasing the number of resource blocks, decreasing cell radius, and decreasing the number of D2D pairs. The auction allocation algorithm cannot be the best choice for increasing the system data performance because there are other algorithms such as the minimum interference algorithm.

Keywords: *Device to Device* (D2D), ENB, *Data rate,* Spectral Efficiency, *Auction*