

## ABSTRACT

Device-to-Device (D2D) communication system is a system that allows two or more users to communicate directly without involving Base Station (BS). D2D communication and Cellular User Equipment (CUE) can share the same resource. However, sharing the same resources may cause interference which results in impairments of performance parameters. Hence, the D2D communication systems need an effective resource and power allocation scheme to reduce the impact of interference that occurs.

In overcoming problems in the D2D communication system, a resource allocation scheme was designed using the Hungarian algorithm and power allocation using the Geometric Water Filling (GWF) method. This study will be conducted on single-cell in the downlink direction. Resource and power allocation is performed by fulfilling the Power Domain Non-Orthogonal Multiple Access (PD-NOMA) principle.

After implementing the allocation scheme then performed calculation and analysis of the performance parameter. The result then will be compared with another scheme that uses the resource allocation using Hungarian algorithm with power allocation using the fixed method. The GWF method has a better performance of 8.271% for the total sum data rate, 8.283% for power efficiency, and 8.271% for spectral efficiency compared to the fixed method. The GWF method has an average value of  $2.907 \times 10^7$  bps on sum data rate,  $2.907 \times 10^5$  bps/mw on power efficiency, and 8.075 bps/Hz on spectral efficiency.

**Kata Kunci :** *Device-to-Device, PD-NOMA, Hungarian, GWF*