

ABSTRACT

The Device-to-Device (D2D) communication offers solution for energy efficiency problem, which is one of the hottest issues in next generation cellular communication. Due to rising electricity bill, operator are pushed to decrease their operational expenditure. Moreover, we must find a way to decrease energy consumption in user devices. The cluster system in D2D is expected to tackle these problems.

Using MATLAB, several simulations were performed. The analysis of clustering and cooperative clustering in D2D communication were discussed. The clustering, cooperative clustering and cluster head rotation method, which are state-of-the-art methods in D2D communication, was used. Through several simulations, energy efficiency of *device* was examined. Simulations in this work consist of: the effect of difference scenarios, rate, and number of *device* per cluster for energy efficiency.

First simulation, we studied the impact of different number of mobile terminals per cell for energy efficiency. The result shows that cell with greater number of mobile terminals has higher mobile consumption. Furthermore, compared with other cells, cell with cooperative clustering method has less energy consumption. As example, scenario which use cooperative clustering, spend 23% percent more energy compared to scenario which apply clustering. Thus, we can draw conclusion that cooperative clustering method is more energy efficient compared to clustering method. Secondly, we also examined the impact of different data transfer rate for *devices* energy consumption. The result shows that energy consumption rate is decreasing exponentially along with increment of data transfer rate. Finally, we investigated the impact of different number of cluster members per cluster. The result informs that, in scenario with clustering method, the variation in number of MT per cluster relatively did not affect energy consumption. However, each one increment of number of mobile terminals per cluster increase energy consumption approximately by 25% in scenario with cooperative clustering method.

Key Words : *Device-to-Device Communications, LTE- Advance, Short range(SR), Long range(LR).*