

## ABSTRACT

This Final Project conducts a study of underlay relay-assisted Device-to-Device (D2D) communication on LTE networks. This Final Project proposes Nash Bargaining as a power control method on D2D devices. This Final Project views Nash Bargaining as a scheme that is able to control power over D2D. So when D2D and CU are indicated to share the same resource block, D2D does not give too much interference to Cellular Users (CU).

To limit interference caused by using the same resource block, this Final Project uses Nash Bargaining as a power control method. Nash Bargaining works by bargaining between the utility and the data rate to determine the amount of transmit power per D2D. Next, the Greedy Algorithm and Random Allocation are chosen to allocate block resources. The algorithm is tested on two scenarios, variations in the number of D2D pairs and variations in the distance of D2D pairs. The proposed scheme is evaluated in the simulations using computer software.

Simulation results show that the algorithm that uses Nash Bargaining as a power control method has better energy efficiency than the algorithm without power control, because Nash Bargaining is able to keep transmit power low without significantly reducing the data rate. The results of this study are expected to be useful for the development of D2D communication technology.

**Keywords:** Device-to-Device, Nash Bargaining, power control, efisiensi energi.