ABSTRACT

The high public demand for wireless communications has an impact on the dense use of the frequency spectrum. Spectrum utilization can be reduced by using cognitive radio technology. The implementation of cognitive radio technology really supports the development of cellular communications, especially femtocell network technology which has advantages in terms of spectrum scarcity. Femtocell technology can also share spectrum with macrocell networks. However, its existence encountered interference caused by the disproportionate use of transmit power from each user. In this case, it is necessary to have an uplink power control system applied to the usage side to reduce interference caused by inter-cell interference. This research uses Koskie Gajic's Game Theory approach to a self-adaptive power control system in a cognitive femtocell network. The parameters used in this research are transmit power and SINR. The aim of this research is to increase the efficiency of using transmit power to obtain the target signal to interference noise ratio (SINR) value required by all users. The results of this research show that the use of the Koskie Gajic Game Theory method in the 5 user scheme is able to achieve 2 different system conditions, namely feasible conditions and infeasible conditions. When conditions are feasible, all users are able to achieve convergent target power and SINR. This is influenced by the distribution of users whose distance is limited. Meanwhile, when the system conditions are not feasible, the user cannot achieve convergent target power and SINR, because there is no limitation on the user's distance. The target SINR results achieved by users in this study are in accordance with the specified targets, namely the target SINR for Femto User Equipment (FUE) 16.9 dB and Macro User Equipment (MUE) 23.3 dB.

Keywords: *Cognitive Femtocell, Game Theory Koskie Gajic, Power Transmit,* SINR, *Uplink.*