INTISARI

Penggunaan perangkat *mobile* seluler semakin meningkat, khususnya untuk area *indoor*. Pengguna *indoor* berpindah dari satu sudut ke sudut lain karena aktifitasnya. Pengguna setiap saat menggunakan perangkat untuk mendukung produktivitas mereka. Tetapi, sering sekali pengguna perangkat mengalami masalah sinyal yang tiba-tiba hilang pada saat di area *indoor*.

Teknologi desentralisasi jaringan seluler makro femto, merupakan teknologi yang banyak diterapkan untuk mengatasi masalah ini. Pemasangan femto *base station* dalam ruangan, dapat mengatasi masalah jaringan area *indoor*. Perlu adanya perlakuan prioritas hanya user terdaftar yang boleh terkoneksi ke jaringan seluler femto menggunakan mode *closed access*. Tetapi masalah interferensi menjadi fokus selanjutnya. Penempatan femto *base station* secara acak, dan penggunaan *spectrum sharing* berupa *resource block* pada jaringan seluler makro femto meningkatkan interferensi *co-tier* dan *cross-tier*. Sebelumnya telah dilakukan penelitian terkait pada transmisi *downlink* yang hanya fokus pada masalah interferensi co-tier. Penelitian lainnya juga mempelajari permasalahan interferensi menggunakan potential game untuk mengatur *resource block* pada transmisi *uplink*. Sedangkan penelitian ini mengusulkan pertimbangan interferensi *co-tier* dan *cross-tier* untuk menekan interferensi yang terjadi pada transmisi *downlink* dengan mode *closed access*. *Potential game* digunakan untuk mengatasi masalah pengaturan *resource* di jaringan seluler makro femto. Strategi *best response* digunakan untuk alokasi *resource block* secara dinamis.

Hasil yang diperoleh, *potential game* mampu meningkatkan performa model sistem jaringan seluler makro femto mekanisme *closed access* melalui alokasi *resource block* secara dinamis. Jaringan seluler makro femto yang mempertimbangkan interferensi *cross-tier* dan *co-tier,* menunjukkan performa lebih baik dibandingkan dengan interferensi *co-tier* saja.

Kata kunci – *jaringan seluler makro femto, closed access, interferensi, co-tier, cross-tier, potential game, alokasi resource block, best response, nash equilibrium*

ABSTRACT

The use of mobile cellular devices is growing up exponentially, especially for indoor users. They move frequently from one to another corner depend on their need. Users often use their mobile devices to access the Internet for their jobs. However, sometimes they have sudden signal lost in indoor area.

Decentralization technology for mobile cellular networks is a technology that is being applied to overcome this problem. Applying macro-femtocell networks by installing femto base stations for indoor or apartment resolves network problem for indoor users. Afterwards, the priority of indoor users needs to be set up so that registered users can only access the femtocell. It can be done by using closed access mechanism. But other problem appears, interference from other femtocell or macrocell affects the network performance. Random installation of femto base stations and the use of spectrum sharing, for example resource block, can increase *co-tier* and *cross-tier* interferences. Previous research related to downlink transmission just focus on co-tier interference has been done. Other research also studied interference problem using potential game in uplink transmission to manage resource block. However, this research proposed consideration of co-tier and cross-tier interferences to mitigate interference appears. Potential game is used to address the issue of resource allocation in cellular networks. Best response strategy is used for resource block dynamic allocation.

The results show that Potential game with closed access mode improves macro-femtocell networks performance through dynamic allocation of resource block. Macro-femtocell networks which consider *co-tier* and *cross-tier* interferences point out better performance than consider the *co-tier* interference only.

Keywords: macro-femtocell networks, decentralization, interference, closed access, co-tier, cross-tier, potential game, resource block allocation, best response, nash equilibrium.