

Abstract

Cellular operators in Indonesia are starting to roll-out 4G LTE services. The obstacles arise when no single operator meets the minimum requirement to run the LTE-Advanced 4G service recommended by 3GPP release-10, which is the minimum bandwidth of 20 MHz. Carrier aggregation (CA) is considered as an alternative solution for the operators to be able providing the large bandwidth for LTE-Advanced 4G services. Carrier aggregation is a virtual carrier merging technique to obtain a larger bandwidth. This work focused on examining the performance of carrier aggregation technique and compare with non-carrier aggregation technique. The tests conducted by a simulation using a software simulator in 4 urban districts in Bandar Lampung. The scenario composed of the technique of carrier aggregation inter-band non-contiguous by using the primary frequency of 900 MHz and the secondary frequency of 1800 MHz, with the total bandwidth of 25 MHz. It is then compared to the technique of non-carrier aggregation with a single frequency band of 900 MHz with the total bandwidth of 5 MHz. Moreover, it is also compared to the non-carrier aggregation technique that has a total bandwidth of 20 MHz by 1800 MHz single band frequency. The results show 92,30% of users were served by carrier aggregation technique, compared to 82,5% and 18,50% for the non carrier aggregation with single frequency band of 1800 MHz and 900 MHz consecutively. In term of throughput, the results show that carrier aggregation technique have 557,224Mbps compare to the non-carrier aggregation of 494,098 Mbps and 102,534 Mbps. All the outperformed results are due to the small bandwidth availability on those single frequency bands. The further work might be considered on 3 or more component carriers to be aggregated in order the analyse the performance of this technique.

Keywords: Carrier Aggregation, *Interband non-cotiguous*, Simulation, *Connected user*, *Througput*.

Abstrak

Operator seluler di Indonesia saat ini mulai menggelar layanan 4G LTE. Kendala muncul ketika belum ada satupun operator yang memenuhi persyaratan minimal untuk menjalankan layanan 4G LTE-Advanced yang ditetapkan oleh 3gpp release-10, yaitu *bandwidth* minimal sebesar 20 MHz. *Carrier aggregation* (CA) hadir sebagai solusi alternatif agar operator dapat tetap menjalankan layanan 4G LTE-Advanced. *Carrier aggregation* sendiri merupakan teknik penggabungan *carrier* secara virtual untuk mendapatkan *bandwidth* yang lebih besar. Pada *skripsi* ini akan menguji performa dari teknik *carrier aggregation* dan membandingkannya dengan teknik *non-carrier aggregation*. Pengujian dilakukan dengan simulasi menggunakan *Software* simulator di 4 Kecamatan yang tergolong daerah urban di Kota Bandar Lampung. Skenario pengujian adalah menggunakan teknik *carrier aggregation inter-band non-contiguous* yang menggunakan frekuensi *primary* 900 MHz dan frekuensi *secondary* 1800 MHz. Hasil uji *connected user* untuk *carrier aggregation* menunjukkan sebanyak 92,30% *user* terlayani. Sedangkan, untuk teknik *non-carrier aggregation* dengan frekuensi 900 Mhz sebanyak 18,20% terlayani dan untuk *non-carrier aggregation* dengan frekuensi 1800 MHz sebanyak 82,50% *user* terlayani oleh jaringan. Untuk hasil uji *throughput* teknik *carrier aggregation* memiliki *throughput* sebesar 557,244 Mbps, dan untuk teknik *non-carrier aggregation* frekuensi 900 Mhz dan frekuensi 1800 MHz hasilnya adalah 102,534 Mbps dan 494,096 Mbps. Hasil uji performa yang meliputi *connected user* dan *throughput* menunjukkan bahwa teknik *carrier aggregation* memiliki hasil yang lebih bagus dibandingkan dengan teknik *non-carrier aggregation*. Hal tersebut terjadi karena perbedaan jumlah *bandwidth* yang digunakan dari masing-masing skenario. Untuk penelitian selanjutnya diharapkan dapat menganalisis performa dari agregasi tiga buah *component carriers*.

Kata kunci : *Carrier Aggregation, Interband non-cotiguous, Simulasi, Connected user, Througput.*