

## ABSTRACT

Long Term Evolution (LTE) 3,9G/4G Release 8 is the latest project of Third Generation Partnership Project (3GPP) that is the development of earlier technologies, such as UMTS (3G) and HSPA<sup>+</sup> (3.75 G). LTE data transfer rate is up to 100 Mbps for downlink and up to 50 Mbps for uplink. LTE uses OFDMA for downlink air interface and SC-FDMA for uplink air interface. LTE has flexible operation bandwidth, there are 1,4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, and 20 MHz <sup>[1]</sup>.

Indonesia LTE network development will have done on the next few years and in order to serve high traffic demand and wide coverage, one of factors that have influence is placement position of e Node B (*Evolved Node B*) LTE. Hence, in this final project, placement planning of eNodeB on Bandung city using Genetic Algorithm that is simulated in Matlab had done. Genetic Algorithm is one of optimization problem solver that are using specific parameters to do nature selection mechanism a genetic manipulation <sup>[7]</sup>.

In this final project, LTE cell planning based on traffic capacity and coverage had done. It uses 2100 MHz frequency with 20 MHz bandwidth and from this cell planning, 49 eNodeB with 1.15 km radius of each are got. Genetic Algorithm has a role in this 49 eNodeB placement planning in order to get the most optimum position that can cover Bandung city traffic demand and coverage.

Using Genetic Algorithm parameters combination such as biner cromosom representation, population size 50, crossover probability 0.9, mutation probability 0.0056 and 1000 generation, the most optimum eNodeB placement with 591513 fitness value is got. Using Genetic Algorithm, system can cover 90,3% Bandung city total traffic demand and coverage. Computation time that is needed by Genetic Algorithm is around 74 hours. Evolutionary Programming algorithm is also simulated as a performance compared algorithm. Using parameter  $\alpha = 0,2$ , the most optimum eNodeB placement with 68733,7635 fitness value is got. Using Evolutionary Programming, system can cover 92,15 % Bandung city total traffic demand and coverage. Computation time that is needed by Evolutionary Programming is around 65 hours. Based on simulation results above, we can conclude that Evolutionary Programming performance is better than Genetic Algorithm.

Keywords: eNodeB, Long Term Evolution (LTE), Genetic Algorithm, Evolutionary Programming