

## ABSTRACT

Base station is the main network element in cellular networks deployment include LTE that nowadays widely used for data communication (e.g. internet access). The vast area of placement, position variation and number of users as well as environmental factors spawned a vastly searching solution space, so that this BTS placement is an NP-hard problem. Planning process is started by defining through a dimensioning exercise that captures few constraints, for instance capacity and coverage.

Network planning optimization frequently use meta-heuristic algorithm to find the optimum solution. Grey Wolf Optimizer (GWO), one of meta-heuristic algorithm that inspired from food searching process of grey wolf pack. This algorithm has been implemented in many engineering cases, including the placement of base stations on LTE networks. The advantage of this algorithm lies in the number of parameters and the simplicity of the process. GWO allocates exploration phase and exploitation phase in the same portion, so it still faces the issue of diversity in the solution process.

This thesis proposes modified GWO to optimize base station location in LTE network in order to achieve better performance of the network capacity and coverage whilst consider network and environment constraint to increase network capacity and coverage. GWO has two vector coefficients, A and C, useful for local optima avoidance and manage exploration and exploitation phases. The proposed algorithm modifies GWO by changing the value of  $\alpha$ . In the original GWO algorithm, the value  $\alpha$  is changed linearly along the iteration, while in the proposed algorithm, the value of  $\alpha$  changes based on the double steps equation that differentiate between exploration phase and exploitation phase. The simulation covered variation of areas, user number and user density.

The work evaluated the number and locations of BTS deployed, coverage area and number of users that can be handled by applying meta heuristic approach : modified grey wolf optimizer using double step equation and compare it to grey wolf optimizer. This new proposed GWO named double step GWO obtained better result due to its longer exploration phase.

Keywords : Base station location, LTE Network, and Grey wolf optimizer, coverage, capacity