

**Session Topic: Commission F (Wave Propagation and Remote Sensing).
F1. Propagation modeling and measurement.**

**Radiowave propagation model for cellular mobile
communication systems using Genetic Algorithms.**

** Lambros V. Skarlas, Stavroula D. Bouzouki and Spiridon D. Likothanassis*

Abstract

This work presents the results from the application of evolutionary computation techniques to a radio wave propagation measurements campaign for cellular mobile systems coverage characterization in urban areas. The experimental data was collected through a mobile measurement system and the results were compared with the most known coverage prediction models. A new path loss prediction model for urban areas is proposed using a genetic algorithm.

One of the problems that are of continual interest to the wireless system designers, is the estimation of the actual area coverage per cell. Bearing in mind, the cell planning aspect of the next generations of mobile cellular communication systems, the objective is to evaluate the coverage either before the system is handed over to the operator or after a system modification or cell site addition.

This propagation prediction model would satisfy the demands of the cell planning of the mobile cellular communication systems more efficiently and more easily. It can be adapted in the geographical area of interest, since less computational time is needed and more specific geographical information for the prediction of the coverage is given.

Using Friis Free space path loss model, that ignores phenomena like reflection, diffraction and scattering, the deviation between the measurements and the model's suggested prices was presumably, was found to be very high. Using OKUMURA's and modified HATA-OKUMURA's models, for frequency equal to 900MHz, their predicted values for the received power were closer to the actual experimental ones. The comparison of our suggested model with other models such as, the empirical HATA model (the first modified model which appeared in a CCIR report in attempt to extend the HATA model to cover greater distances), the ITU-R P.529-3 and the ERC REPORT68, shows that our model is the most suitable for general use. Moreover, it is worth mentioning that the adaptability of the model is such that it can accurately predict the radio wave's propagation in macro cell metropolitan urban areas and in micro cell suburban areas.