Prediction of received signal power and propagation path loss in open/rural environments using modified Free-Space loss and Hata models

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Abstract

This paper describes a modification of the Free-Space and Hata formulae for the prediction of received signal power, P_R and propagation path loss, L_P, in two cellular mobile radio systems (CMRS), in the Northern Nigeria. Measurements of P_Rs were taken with a Cellular Mobile Radio test Receiver (Sagem OT 160), in some selected open/rural environments, when the receiver was being moved away from the base stations along the propagation paths. L_Ps were then obtained from values of measured P_Rs using an appropriate expression. A close comparison of measurement values and computed values from the free-space and Hata formulae revealed that direct application of these formulae is inappropriate for the prediction of these parameters in the region of investigation, as computed values fell short significantly from the corresponding measured values. Consequently, some correction factors have been introduced to both models and these have produced results which closely matched the measured values.

Keywords: Propagation losses, Predictive models, Land mobile radio, Antennas and propagation, Power engineering and energy, Receivers, Mobile antennas, Electromagnetic propagation, Base stations, Radio propagation

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