**An Empirical Propagation Model for Path Loss Prediction at 2100MHz in a Dense Urban Environment**

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**Abstract**

Objectives: Radio propagation models are used to predict signal strength in order to characterize the radio frequency channel. This will help in providing sufficient data required for the design of appropriate receivers that can recover the transmitted signal distorted due to fading and multipath effect. Methods/Statistical analysis: Data collection was carried out through drive test using TEst Mobile System, TEMS W995 phone interfaced with TEMS investigation tool version 13.1, Gstar GPS location finder and MapInfo professional and analyzed using Root Mean Squared Error (RMSE) statistical tool and tenth degree polynomial for fitting measured data with empirical models. Findings: Considering the contending empirical propagation models, the Ericsson model showed a better fit for the measured path loss data with root mean squared errors of 5.86dB, 5.86dB and 5.85dB at 1.0m, 1.5m and 2.0m mobile antenna heights respectively in comparison with Okumura model which is currently in use. It also outperformed other investigated models which are; Hata, COST 231, and SUI models at 2100MHz. These findings will help in revamping radio frequency planning and system design of the investigated and similar terrains thereby optimizing overall system performance while minimizing dropped calls, handover/quality issues and other network inherent failings. Application/Improvements: Results showed a minimum error estimate within the acceptable range of 6dB for signal prediction. This model can be used for signal prediction and channel characterization of any wireless mobile environment with similar channel characteristics. The other propagation models that over predicted the radio channel could be further investigated in future work and possibly tuned to accommodate dense urban areas.

**Keywords**

Ericsson Model, Okumura Model, Propagation Model, Path Loss, Signal Prediction

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