Determination of Best-fit Propagation Models for Pathloss Prediction of a 4G LTE Network in Suburban and Urban Areas of Lagos, Nigeria

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Abstract: *Propagation measurements and modeling provide useful information for signal strength prediction and the design of transmitters and receivers for wireless communication systems. In order to deploy efficient wireless communication systems, path loss models are indispensable for effective mobile network planning and optimisation. This paper presents propagation models suitable for path loss prediction of a fourth generation long-term evolution (4G LTE) network in the suburban and urban areas of Lagos, Nigeria. The reference signal received power (RSRP) of a 4G LTE network was measured at an operating frequency of 3.4GHz, and measured data was compared against existing pathloss models. Among the candidate models, the COST 231-Hata and the Ericsson models showed the best performances in the urban and suburban areas with root mean squared errors (RMSEs) of 5.13dB and 7.08dB, respectively. These models were selected and developed using the least square regression algorithm. The developed models showed good prediction results with RMSEs of 6.20dB and 5.90dB in the urban and suburban areas, respectively, and compare favourably with propagation measurement results reported for similar areas. It was found that these models would better characterise radio coverage and mobile network planning, enhancing the quality of mobile services in related areas.*

Keywords: *4G LTE network; Path loss modeling; Propagation models; Suburban; Urban area, Least square regression*