

HATA, COST - 231, EGLI and ILORIN - A PERFORMANCE ASSESMENT

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ABSTRACT

Information carried through the wireless medium are subject to impairments due to several events along the route of transmission, leading to path losses. For effective network planning therefore, these events and their effects on radio propagation need to be known and accounted for. In this work, we studied the radio propagation profile, along selected routes in Ilorin, Kwara State due to transmissions from the NTA, Ilorin, the Harmony FM and the University of Ilorin FM transmitters. Each of the routes are divided into segments, as seen, in the figures. The measurements were made, using the N9432C Agilent spectrum analyzer. Analysis, of obtained data, showed that the nature of the environment, affects radio propagation. Even within the same route and all other conditions the same, the models' relative performances vary, from one segment to the other. The performances of the models corroborate the notion that empirical models are environment-specific.

Keywords: Path loss prediction, Radio propagation profile, Wireless network planning, Received signal level

INTRODUCTION

The wireless medium had, since, become the transmission medium of preference, on account of ease and possibly, costs of deployment and safety. The transition, from fixed telephone to wireless telephone had become one of the most dramatic impacts technology had on man. Starting with the first generation mobile telephone (FDMA) to the second, (TDMA) third and the Long Term Evolution of today, high data rate, economy of spectrum, low power consumption, long range, resistance to interference, increased voice quality remained some of the critical parameters, driving the metamorphosis and it has been startling. The limitations set, on achieving these desired goals in information transmission, through the wireless medium, due to various factors characterizing the path, however, constitute challenges and desire to be understood and accounted for, in the course of radio network design and planning. It had been sufficiently established that not only meteorological but environmental factors affect radio propagation. This is the main plank of investigations into the phenomenon of radio propagation and factors that affect it.

A plethora of works done, in this area, have led to formulations leading to path loss estimation and hence effective wireless network planning.

Classical researchers, such as Okumura, Hata, Longley-Rice, Durkin etc, can be credited with pioneering work in this area. They formulated path loss estimation models at the VHF, UHF and lower microwave bands. We, also, have some contemporary researchers, who have been working, with the aim of testing, for purpose of validation or moderation of the existing formulas, for use in different frequencies and terrains.

The rest of the paper is organized thus: Section II discusses related work, section III, experimental data, section IV, discussion of results and section V draws conclusion from the results.

RELATED WORK

Radio waves propagate in modes that are classified into three broad categories: reflection, refraction and ducting. It is also noted that the terrestrial configuration, along the path of propagation plays a large role. This necessitates that modeling of radio path, takes into consideration, the atmospheric behaviour of radio waves and the terrain configuration, so that field strength prediction can be comprehensive. Several models have been formulated for the prediction of path loss, in both indoor and outdoor propagation scenarios. The potency of these models, lie in the fact that they