

## Measurement of Signal Powers and Path Loss Predictions of Ibrahim Badamasi Babangida University Lapai Click FM (89.9 MHz) Within the Main Campus

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### ABSTRACT

*Several factors affect radio propagation. These factors are determined by its path from point of propagation to the point of reception. Therefore, there arises the need to measure the received signal power at points away from the transmitter base in order to reduce these effects. The measurements of the signal power of 89.9 MHz Ibrahim Badamasi Babangida University Campus Click FM Radio was conducted along four profiles, namely Profile A (along 250 Hall), Profile B (along ICT Centre), Profile C (towards Entrepreneurship Centre) and Profile D (towards the Senate Building). Five measurements were considered with intervals of 50m away from the base station successively for each profile. An Agilent handheld spectrum analyzer, GPS receiver tape rule and a mobile receiving antenna were used for the measurements. It was observed that the signal strength – Line of Sight distance (LOS) characteristics were very similar in each of the four routes and that the little variation among them was due to environmental factors such as vegetation and buildings. In most cases, the signal power reduces with an increase in distance, and therefore, the path loss prediction was made using the Free Space Path Loss Model, Ericsson Model and Lee's Model. The highest losses were 237.5 dB, 265.5 and 214.00 dB for Free Space Path Loss Model, Ericsson Model and Lee's Model respectively while the lowest losses were 225.5 dB, 224.1 dB and 189.8 dB respectively. The contour map was also developed. The studies recommend that the radio frequency of the station and the transmitting antenna height should be increased.*

**Keywords:** contour map, line of sight, path loss, signal power

### 1. Introduction

A radio wave is an electromagnetic wave which emanates from a radiating source (Bakare *et al.*, 2019). Radio waves propagating through space undergo loss of power or path loss. There is usually a reduction in the quality of wireless signal when there are blockages or obstacles like buildings within their line of sight. This is because the signal line of sight is being obstructed by these obstacles. As such, some of the signal quality will be lost because of these obstacles (Elechi, 2016). These radio waves travel from transmitter to receiver in three types of modes known as radio propagation modes namely; Ground Surface wave, Tropospheric or Space wave and Ionospheric or sky wave (Lodro, 2016). The space wave that travels on the line of sight from the transmitter