

## Enhancing Signal Reception in a Mobile Radio Network Using Adaptive Beamforming Antenna Arrays Technology

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**Abstract :** This work is aimed at enhancing signal reception on a mobile radio network and minimizing outage probability in a mobile radio network using adaptive beamforming antenna arrays. In this research work, an empirical real-time drive measurement was done in a cellular network of Globalcom Nigeria Limited located at Ikeja, the headquarters of Lagos State, Nigeria, with reference base station number KJA 004. The empirical measurement includes Received Signal Strength and Bit Error Rate which were recorded for exact prediction of the signal strength of the network as at the time of carrying out this research work. The Received Signal Strength and Bit Error Rate were measured with a spectrum monitoring Van with the help of a Ray Tracer at an interval of 100 meters up to 700 meters from the transmitting base station. The distance and angular location measurements from the reference network were done with the help Global Positioning System (GPS). The other equipment used were transmitting equipment measurements software (Temsoftware), Laptops and log files, which showed received signal strength with distance from the base station. Results obtained were about 11% from the real-time experiment, which showed that mobile radio networks are prone to signal failure and can be minimized using an Adaptive Beamforming Antenna Array in terms of a significant reduction in Bit Error Rate, which implies improved performance of the mobile radio network. In addition, this work did not only include experiments done through empirical measurement but also enhanced mathematical models that were developed and implemented as a reference model for accurate prediction. The proposed signal models were based on the analysis of continuous time and discrete space, and some other assumptions. These developed (proposed) enhanced models were validated using MATLAB (version 7.6.3.35) program and compared with the conventional antenna for accuracy. These outage models were used to manage the blocked call experience in the mobile radio network. 20% improvement was obtained when the adaptive beamforming antenna arrays were implemented on the wireless mobile radio network.

**Keywords :** beamforming algorithm, adaptive beamforming, simulink, reception

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