Abstract

Good signal reception depends on a reliable communication link. However, as the signal travels through the communication medium, several factors affect the quality of the signal at the receiver. In Ku band digital satellite transmission, rain is the major cause of link impairment. Global rain rate and rain attenuation prediction models have been developed to predict rain rate and rain attenuation at various locations. These models have not been applied and tested with measured data to determine their prediction accuracy in the Ghanaian tropical region. In this paper, the Moupfouma and International Telecommunication Union Recommendation (ITU-R) rain rate models were applied and compared with measured local 1-minute data for Kumasi. The result was used to select an appropriate prediction model to be applied to all 22 synoptic stations across Ghana. The ITU-R rain attenuation model was then used to predict the rain attenuation for Ghana. The values obtained were used to develop a rain rate and rain attenuation geographical map for Ghana using the inverse-distance weighting method and ArcGIS software. As Ghana migrates from analogue to digital satellite television broadcasting, it is
imperative to investigate the effect of rain on the signal. This will serve as a tool for system
designers to determine the appropriate effective isotropic radiated power (EIRP) and receiver
characteristics for Ghana.

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**Index Terms**

Computer Science  
Signal Processing
Keywords

Rain rate, rain attenuation, Ku band.