

Microwave signal attenuation over terrestrial link at 26 GHz in Malaysia

Abstract:

The effect of rain on the microwave systems is more critical especially for countries located in tropical and equatorial region that experience high rainfall rate throughout the year. In order to predict a reliable and an accurate rain prediction model, it is required to determine the one-minute integration time of rainfall rate together with direct measurement of rain attenuation. In order to counter the current trend of employing higher frequencies especially in tropical and equatorial regions, there is an urgent need to carry out studies related to the effect of rain in order to get a better rain attenuation prediction model. Therefore, the purpose of this study is to investigate the effect of rain on terrestrial microwave system operating at 26 GHz in Malaysia. The rain intensity with one minute integration time is measured at Universiti Teknologi Malaysia-Skudai (UTM-Skudai) and 99 rain gauges located throughout the Peninsular Malaysia. This study explains the detailed experimental set up and analyses of both rain rate and rain attenuation measurements. The analysis on large-scale study area includes the comparisons between the measured rainfall data and the Drainage and Irrigation Department (DID) rainfall data and also with the Malaysia Meteorological Services (MMS) rainfall data. This study has successfully proposed a new rain rate and rain attenuation prediction model and the obtained results show satisfactory performance and good agreement.