

ABSTRACT

The present work investigates the effect of propagation impairment on a fixed satellite communication link on earth-space path for Ku-band frequencies. Major impairment studies in the current work are rain attenuation and tropospheric scintillations for the location Vijayawada(KLUUniversity) .The standard elevation angle of 62.65° for the satellite INSAT 4A/GSAT -10 is used in the computation of propagation impairments. Vertically polarized waves are considered .The study is basically divided into three parts. The first part deals with the collection of rain data using OTT Percival disdrometer and collection of beacon data using low cost experimental setup. OTT Percival disdrometer gives the measurements such as, rain intensity, precipitations since start, radar reflectivity, rain spectrum etc. The rainfall is estimated using Marshal Palmer and Batten empirical relations. In the second part, the drop size and velocity are calculated, and the estimation of drop size distribution based on rainfall on seasonal basis, for different disdrometer integration periods is completed. A disdrometer records the spectrum with a default interval of 10sec. Drop size distributions are made using exponential, Lognormal and Gamma distributions. The third part deals with selection of appropriate models, along with ITU-RP for the estimation of impairments such as, percentage of link unavailable time, with percentage time exceedance between 0.001% to 10% for the location by using the cumulative rain fall data from the year 2012 to 2014. The models used in this works are MM, RH, SAM, and ITU-RP. The results of impairments by using the above models for the location are compared with the results obtained from measured data. Tropospheric Scintillation calculations are measured using ITU-RP. In the current work the attenuation due to scintillation and rain are estimated separately, and the appropriate mitigation techniques are proposed.