ABSTRACT

Fifth generation (5G) technology is predicted to use high frequencies, namely 6 GHz - 100 GHz. Where the use of high frequencies is sensitive to natural conditions, one of which is temperature. Channel characteristics are represented in the Power Delay Profile (PDP) using the New York University Simulation (NYUSIM) channel simulator. The results of the research on the 5G channel model obtained in this study were 59 paths with the effect of a maximum temperature of 30.4^{o} C and 59 paths with the influence of a minimum temperature of 18^{o} C. In this study, 9 paths of each PDP were used as representatives to calculate the outage performances. , FER, and BER. The results of the 5G channel model to obtain an outage probability of 10^{-4}, for the effect of maximum and minimum temperature, then the E_b/N_0 required for coding rate (R) ½ is 15.352 dB and 15.122 dB, R = ¾ is 16.625 dB and 16.329 dB and R = 1 are 17.711 dB and 17.487 dB. The performance results of the Frame Error Rate (FER) and Bit Error Rate (BER) are evaluated at the point E_b/N_0 = 25 dB, with R = 1. The FER performance in the maximum temperature scenario produces a value of 0.1089, while for the minimum temperature scenario it is 0.1078. The resulting BER performance in the Rayleigh fading theory is $8.44x10^{-4}$. Then the BER performance in the maximum temperature scenario is $9.349x10^{-4}$ and the minimum temperature scenario is $9.067x10^{-4}$. Judging from the results obtained channel capacity, outage performance, FER performance, and BER performance, it can be concluded that the minimum temperature gets better performance results than the maximum temperature and it can be concluded that temperature can affect the performance of the 5G communication system in Wonosobo City.

Keywords: Temperature Effects, QPSK, 5G, Channel Model, Power Delay Profile, Outage Probability, FER, BER.