

ABSTRACT

Free Space Optics (FSO) is an optical communication system without the use of cables, in some of its developments the use of FSO has been used as a means of communication which continues to be developed by utilizing free space as its transmission. FSO technology utilizes the work system *Line Of Sight (LOS)* using LASER as a light source that carries data. FSO has the advantage of having high bandwidth, low installation costs, but this communication system is greatly affected by weather such as rain. In this final project, the FSO system is simulated and analyzed using 16-PSK modulation and comparing with QPSK modulation by utilizing three rain conditions, namely light, moderate and heavy rain, using wavelengths of 1310 nm and 1550 nm at a distance of 3 km, 5 km and 10. km, using 1, 10 and 20 watts of power as the power source used. The final result is the *bit error rate (BER)*.

The results obtained from the simulation show that the higher the value of the wavelength used, the better the coverage. In the first scenario the range measurement utilizes a modulation comparison of 16-PSK and QPSK for all rainy conditions, using wavelengths of 1310 nm and 1550 nm at a distance of 3, 5, and 10 km. For comparison the 16-PSK modulation has a BER value and a good range, at a distance of 3, 5, and 10 km it has a value of 0.049 and for BER values that are close to the minimum standard are obtained in light rain conditions along the wavelength of 1550 nm at a distance of 1.06 km. which has a BER value of 3.97×10^{-9} . For QPSK at a distance of 3, 5 and 10 using wavelengths 1310 and 1550 has a value of 0.254 with a BER value is at a distance of 1.02, namely 3.19×10^{-10} . Whereas for the second scenario by comparing the power usage of 1, 10 and 20 watts used at wavelengths of 1310 nm and 1550 nm with a distance of 3, 5, 10 km shows that the BER value at 20 watts of power has a fairly good coverage. Shown at a wavelength of 1550 nm to 0.450 at a distance of 3 km with light rain conditions and a BER conditions with a wavelength of 1550 at a distance of 1.32 km, namely 4.99×10^{-9}

Key Word : FSO, 16-PSK, BER, Rain Attenuation.