ABSTRACT

The factor driving the development of optical communication systems is the need for a communication system with a high data rate that can overcome the last-mile bandwidth bottleneck. FSO is a new technology that offers high data transmission rates and can solve the last-mile bandwidth bottleneck. FSO is one type of OWC that transmits signals from the transmitter to the receiver directly or LoS using a laser. Fog is considered a major challenge for the FSO system. Fog conditions have the potential to produce optical pulse widening which can cause ISI problems and reduce the performance of the FSO system. On the other hand, OFDM is widely used in wired and wireless broadband communication systems because of its resistance to ISI to minimize error bit values.

This final project aims to analyze the performance of the FSO system that has been combined with OFDM and it is hoped that with the use of OFDM the performance of the FSO can be more optimal when the weather is in fog conditions by taking into account the value of laser delivery power and the number of different subcarriers. The OFDM-FSO system modeling and accurate fog attenuation is expected to help telecom operators to properly engineer their networks in the future. In this final project, OFDM-FSO is simulated using 16-QAM modulation at three types of wavelengths, namely 850 nm, 1310 nm, 1550 nm with variations in the distance from the transmitter to the receiver as far as 0.5 km - 5 km with a range every 0.1 km.

The results of this final project show that the value of BER to the optimal distance is obtained when using a transmission power of 5 W, a wavelength of 1550 nm, and a subcarrier of 512. Laser transmit power and a high number of subcarriers can increase the distance the link becomes even further. This is because the greater the sending power of the laser emitted, the photodetector can better capture the laser so that the link distance traveled can also be further away and by using a large number of subcarriers it will reduce subcarrier spacing and increase symbol time.

***Keywords**: FSO, OFDM, Fog, Kim and Kruse Channel, BER.*