ABSTRACT

Inter-Satellite Optical Wireless Communication (Is-OWC) is a development of inter-satellite communication systems that use light sources derived from lasers as senders. These systems are used to minimize losses, increase system bandwidth, and transmit high bit rates. Is-OWC communication uses lenses to focus light from the sender side to the receiving side. Therefore, the size of the lens diameter will affect the performance of long-distance communication systems between satellites, in addition to the wavelength operation of the optical source. Coherent optical orthogonal frequency division multiplexing (CO-OFDM) systems are also used to minimize the effects of multipath fading that occur in the long-distance transmission and improve receiver sensitivity. Therefore, this study will observe the effect of aperture diameter and optical source wavelength operation on the performance of the Is-OWC system using OFDM multiplexing and coherent detection techniques, in this case using external optical conversion methods and 4-QAM modulation. The system also allows increased transmission distances and improved signal quality compared to traditional satellite communication technologies. This research was conducted by simulation using optical system 19 software. The aperture diameter to be used is 10 to 30 cm and the wavelength operation used is 850 and 1550 nm. The parameters to be analyzed are Bit Error Rate (BER), *Symbol Error Rate* (SER), *Error Vector Magnitude* (EVM) *and Received Optical Power. The results of this study show that acceptability will increase with the increase in aperture diameter. Power received reaches -30 dBm at both wavelengths at an aperture diameter of 30 cm. BER, SER, and EVM get smaller as the aperture diameter increases. The 850 nm wavelength obtained a standard BER value of* $1{,}7\times10^{-8}$*, while the 1550 nm wavelength obtained a BER of* 7×10^{-6}.

Keywords: *Is-OWC, OFDM, Aperture diameter, Wavelength, Bit Error Rate.*