

ABSTRACT

Inter-satellite optical wireless communication (IS-OWC) systems use lasers as optical carrier signals with very high data rates for long-distance communication use between satellites. This system also has advantages such as wider bandwidth and lower Power consumption compared to the use of radio frequency (RF) channels. IS-OWC performance is affected by several parameters such as modulation used, transmit Power, wavelength and so on. Therefore, this study aims to analyze the performance of the IS-OWC system using 16-QAM modulation. The 16-QAM modulation system is used to improve data transmission performance. One 16-QAM symbol contains 4 bits of data consisting of 16 points, so that transmission can be faster and increase data throughput. The parameters that are varied are transmit Power and wavelength, in this case using external optical modulation and coherent detection mechanisms. The observed transmission Power variation is 5-25 dBm with wavelengths of 850, 1310 and 1550 nm. While the analysis parameters are changes in the value of bit error rate (BER), received optical signal spectrum, and received Power. The results showed the use of 25 dBm transmit Power and a wavelength of 850 nm, obtaining the lowest BER value of 0.000244. The transmission Power usage of 25 dBm and wavelength of 850 nm also obtained the highest received optical signal spectrum value of -58.1942 dbm. In measuring the received Power value using a transmit Power of 25 dBm and a wavelength of 850 nm obtained the highest received Power value of -35.379 dBm. Thus, it can be concluded that the use of 25 dBm transmit Power and 850 nm wavelength is more recommended for use in IS-OWC systems with a distance of 3500 km and a bitrate of 20 Gbps.

Keywords: IS-OWC, 16-QAM, Bit Error Rate, Received Optical Signal Spectrum, Received Power