

ABSTRACT

Fiber-optic communications provide a new efficient system for conveying information more safely and quickly. OWC technology was developed into Inter Satellite Communication (IS-OWC) to build a network between satellites so they can communicate with each other. Inter satellite-optical wireless communication (IS-OWC) is a long-distance communication between satellites with very high data rates. To improve the system performance, orthogonal frequency division multiplexing (OFDM) technique can be applied in addition to increasing system efficiency in terms of bandwidth and data rate. So this research proposes the use of digital quadrature amplitude modulation (QAM) modulation combined with OFDM system in IS-OWC communication. Based on the results of this study, the OFDM – ISOWC system that uses 4-QAM modulation is reliable for transmission distance of 500 to 2000 km with a bit rate of 10 to 20 Gbps and at a power of 10 to 20 dBm. The use of greater power results in a smaller BER value, where at a bit rate of 10 Gbps within a distance of 500 km at a power of 10 dBm the Min BER value is 1×10^{-55} and a power of 20 dBm is 1×10^{-65} . While a distance of 2000 km at power of 16 dBm, the value of Min BER is 1×10^{-18} and a power of 20 dBm is 1×10^{-23} . In addition, at a distance of 500 km, the SER value at 10 dBm is 1×10^{-40} and 20 dBm is 1×10^{-58} , while at a distance of 2000 km the power is 16 dBm at 1×10^{-9} and the power is 20 dBm, the SER value is 1×10^{-13} . However, the EVM value at a distance of 500 km is stable at 12 %. The use of a bit rate 20 Gbps also affects the quality of the Min BER, SER and EVM values, where the values meet the standards at a distance of 500 km to 1500 km. In addition, the result of theoretical calculations are compared with the value of the simulation results, where the power received at a distance of 500 km is -25 dBm, while at a maximum distance of 5000 km is -45 dBm. From these results it can be said that the acceptability value between theoretical calculations and simulations is appropriate.

Keyword: IS-OWC, Multipath fading, OFDM, QAM, BER, SER, EVM