ABSTRACT

Nowadays, communication technology has developed rapidly. However, communicating is not something that is easy for submarines under the sea. The optical technology being developed is Visible Light Communication (VLC) technology with the ability to utilize visible light as an information carrier. The VLC technology, which will be implemented under the sea, was chosen with the aim of meeting the need for optical wireless communication to replace radio waves and light that are used safely for humans and marine biota when under the sea.

In this study, an analysis of visible light communication under the sea in terms of distance coverage with depth that can be used when in pure seawater types is carried out. Two simulation scenarios were carried out, the first scenario using Optical Concentrator, testing performance using 4-QAM modulated BER against distance and SNR, the second scenario without using Optical Concentrator, testing performance using 4-QAM modulated BER against distance and SNR.

The result of this research is that it can improve the performance of the UVLC system by using 4-QAM modulation and adding an Optical Concentrator to the Photodiode with a percentage increase of 30% compared to without using an Optical Concentrator. Where at a distance of 1 m to 14.14 m and a depth of 5 m, 10 m, and 15 m respectively, the BER is $1.379x10^{-11}$, $1.593x10^{-7}$, $4.132x10^{-5}$, $1.255x10^{-3}$, $1.519x10^{-3}$, $1.144x10^{-2}$. The SNR values are $4.303x10^{7}$ dB, 223.3 dB, $1.231x10^{8}$ dB, 638.9 dB, $2.172x10^{8}$ dB, 1127 dB. The received power values are $3.389x10^{-4}$ Watts, $7{,}722x10^{-7}$ Watts, $9{,}699x10^{-4}$ Watts, $2.209x10^{-6}$ Watts, $1.711x10^{-3}$ Watts, $3.898x10^{-6}$ Watts.

Keywords: *Underwater Visible Light Communication*, SNR, 4-QAM, BER, *Optical Concentrator*.