

## ABSTRACT

As people's needs in the delivery of information continue to increase, it must be accompanied by reliable telecommunications technology. Technology Visible Light Communication (VLC) is a potential solution for high-speed and short-range wireless communication. However, behind the advantages of VLC which is still being developed, there are several shortcomings, one bandwidth of which is the limited modulation. Non-Orthogonal Multiple Access (NOMA) is proposed to overcome this limitation because in NOMA each user can use the entire bandwidth to get higher spectrum efficiency.

In this final project, a simulation analysis of the NOMA-VLC system using GRPA has been carried out to get a better system performance. The simulation is carried out using modulation On-Off Keying NRZ (OOK-NRZ), the channel used is Line of Sight (LOS) with 1 LED in a simulated room dimension of 10 x 10 x 5 m<sup>3</sup> assuming there is no interference from other light, like sunlight.

The simulation results prove that the LED transmit power will affect the channel receiving power. The greater the transmit power of the LED, the better the receiving power on the channel will be. NOMA-VLC system performance is better when using GRPA than SPA. In GRPA, the target BER 10<sup>-3</sup> is achieved at an SNR of 25 dB with a BER value of 9.67 x 10<sup>-4</sup> for user 1 and 9.67 x 10<sup>-4</sup> for user 2. Based on the simulation of the effect of distance variations on the NOMA-VLC system with GRPA, the first variation in condition 1 when distances d<sub>1</sub>=6.5m and d<sub>2</sub>=5m get superior gains. In the second variation, condition 2 with d<sub>1</sub> = 7.5 m and d<sub>2</sub> = 5.5 m has the best performance. Then in the NOMA-VLC simulation using 3 users, user 1 gets the best BER value than user 2 and user 3.

**Keywords:** Visible Light Communication, NOMA, Gain Ratio Power Allocation, Line of Sight, OOK.