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**ON THE PERFORMANCE OF NORMALIZED GAIN
DIFFERENCE POWER ALLOCATION FOR MIMO-
NOMA-BASED VLC**Ibrahim A. Elewah^{1,2}, Faezah Jasman¹, Sha Shiong Ng^{1,*}¹*Institute of Nano Optoelectronics Research and Technology (INOR), Universiti Sains
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ABSTRACT- In this study, we build a 4×4 multiple-input multiple-output (MIMO) non-orthogonal multiple access (NOMA) based visible light communication (VLC) system. The main goal of this study is to utilize the power consumption among the indoor VLC system by using normalized gain difference power allocation (NGDPA) to ensure the same achievable sum rate even for users on the system borders. The proposed system is simulated to serve 2, 3, and up to 4 users. The obtained results were compared with 4×4 MIMO using orthogonal frequency division multiple access (OFDMA) without applying NGDPA. It was found that the proposed system shows an almost constant achievable sum rate for all users regardless of their current position within the system coverage area. The results show that users on the system edge can share up to 97.32% of the maximum achievable sum rate. The relation between normalized offset and sum rate gain for 2, 3, and 4 users' scenarios is also discussed. The findings reveal that the system using NGDPA scheme can utilize more sum rate gain with increasing the number of users. Through this study, it can be deduced that the 4×4 MIMO-NOMA-VLC system with NGDPA scheme has been performance.

Keywords: Visible light communication (VLC), Multiple-input multiple-output (MIMO), Non-orthogonal multiple access (NOMA), Normalized Gain Difference Power Allocation (NGDPA).