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S. A. Kwang Thai; A. K. Rahman; S. A. Aljunid; R. Endut ; N. Ali; C. B. M. Rashidi



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Enhancement Receiver Sensitivity Under Heavy Attenuation Effect for FSO System via Double Transmission Technique

S.A.Kwang.Thai^{1, c}, A.K.Rahman^{1, b}, S.A.Aljunid², R. Endut^{2, a}, N.Ali², and C.B.M.Rashidi²

¹*Department of Electrical & Electronic Engineering, Faculty of Engineering, Universiti Malaysia Sarawak (UNIMAS), 94300 Kota Samarahan, Sarawak, Malaysia*

²*Faculty of Electronic Engineering & Technology, Universiti Malaysia Perlis (UniMAP), 01000 Kangar Perlis, Malaysia*

Corresponding author: ^{a)} rosdisham@unimap.edu.my, ^{b)} karahman@unimas.my
^{c)} simonang92@gmail.com

Abstract. This paper focus on improvement of receiver sensitivity for free space optical communication. FSO communication is frequently drop performance when facing bad weather. In this research proposed new development of transmitter and receiver design in order to reduce the impact of atmospheric attenuation and increase receiver sensitivity. The analysis performance will compare with conventional amplitude shift keying (ASK) approach. Simulation result will be used to measure the performance and comparison between conventional and new proposed modulation double transmission balance receiver (DTBR) will also presented. The measurement of result will involve the effect of geometrical loss, data bit rate and distance propagation. From the result, the DTBR is increase the receiver sensitivity in term of bit error rate (BER) performance.

INTRODUCTION

As depicted in picture 1, Free Space Optics (FSO) is an optical communication system that transmits data between two sites using light that originates from a LASER and travels across free space. Similar to fibre optic communications, this technology differs primarily in the medium through which signals travel. Unlike FSO data, which is sent in a broad beam across the air, the light used to transport information in optical fibre communications is modulated laser light in a cable. FSO may be thought of as "optical communications at the speed of light" since light travels through air at a greater velocity than it does through glass.

In terms of advantages of FSO technology communication over fiber communication, the FSO is not requiring the licensing from the Federal Communications Commission (FCC). Unlike the RF communication need the licensing for frequency allocation due to RF use the frequency that less than 300 GHz. Apart from that the FSO can support the bandwidth up to 2.5Gbps if compare to RF limited to 622Mbps. The further study has successfully tested 160Gbps in laboratories and speed could potentially be able to reach Terabit range [2,3,4]. The FSO also has an attractive alternative to the excessively high cost of digging the street to lay the fiber and requiring permission from authorities