

## **ABSTRACT**

*The need for increasingly high bandwidth in data traffic has driven the development of optical communication systems, especially through Fiber To The Home (FTTH) networks based on Gigabit Passive Optical Network (GPON). Fiber To The Home (FTTH) with Gigabit Passive Optical Network (GPON) technology has a high speed of up to 2.5 Gbps downstream and 1.25 Gbps upstream which can provide high-speed internet services, video, and telephone services in one infrastructure. Optical fiber is a glass fiber that is used as a medium to transmit light signals at high speed from one place to another. Free Space Optical (FSO) is an alternative technology to replace optical fiber when it is not permitted in a network.*

*Areas for enterprise users where there is no fiber optic network, the design is in Bugel, Tangerang City for enterprise users. A possible solution is to build a Hybrid FTTH and FSO network with Gigabit Passive Optical Network (GPON) technology. This study will design and simulate a hybrid FTTH-FSO access network using optisystem 7.0 software. Network design includes device specifications and hybrid FTTH and FSO network layout, with evaluation based on ITU-T G.984 feasibility standards.*

*Simulation using optisystem to measure parameters such as Bit Error Rate (BER) and eye diagram. based on the results of FSO optimization simulation for output in passive splitter 1:4 when foggy weather conditions maximum distance 5.7 km obtained BER results  $1,014.10^{-9}$  and rainy weather conditions maximum distance 2.3 km obtained BER results  $4,637.10^{-9}$ .*

*Keywords: FTTH, FSO, GPON, BER, OptiSystem*