

ABSTRACT

Optical fiber is a transmission line made of smooth glass or plastic that is used to send light signals from one place to another. One of the network architectures is FTTB, which is widely used in providing internet and communication services. In order for fiber optic services to run optimally, good quality bit rate, Q factor, eye height, threshold, bit error rate (BER) and path loss are required.

Fiber optic networks are the main solution in high-speed telecommunications infrastructure for internet, data and video needs. This system is the backbone of signal transmission in information technology. This research aims to design a fiber optic network in the Telkom University Surabaya building using OptiSystem software. The research process includes needs analysis, system design, network structure development, and testing to ensure the designed network is more efficient and reliable. In addition, an analysis of bandwidth requirements was carried out to increase internet access speed and network capacity for users in the building.

The simulation results show that the system has very good transmission quality. The Q factor value of 620,485 indicates a large signal to noise margin, ensuring signal quality remains optimal. An eye height of $7.13022e-005$ enables accurate signal reading, while a threshold of $4.02242e-005$ keeps transmissions stable by distinguishing valid signals from noise. A BER value of 0 indicates no errors in transmission, indicating high system reliability. And path loss (-17,908 dB) ensures the signal remains strong even over long distances.

Keywords: *Optical Fiber, FTTB, bit rate, path loss, Q-Factor, Eye Height, Threshold, BER, Telkom University Surabaya*