

## ABSTRACT

Technology is the important part that many people looking for their life along with the rapid development of technology in society, especially information and communication technology, provided the public to get an easy and efficient service. Since the increasing number of communities and the needs of the service while needs tools of communication that is able to serve all of the services, such as voice, data, and video, which would be called triple play services. With the rapid development of society and the increasing needs of triple play in the future, it would require a large capacity also to be able to serve those needs.

In this final project researchers designed a hybrid network by combining GPON technology and XGPON to add capacity and as a gradual process for technology migration to XGPON. The design begins by locating, collecting data, and the specifications of the devices used by PT. Telkom. Then be analyzed based on predefined parameters such as link power budget, rise time budget, the signal to noise ratio, and bit error rate.

In this study, the results of calculation and simulation of the migration process to XGPON GPON technology using the merging process technologies to make the process of gradual replacement. The output find namely the incorporation of network designed is feasible to meet the standards set by PT network. Telecom and network standards defined by ITU-T Link Power Budget -20,5547 amounted to GPON and -20.8247 to XGPON, Rise Time Budget worth 0.2516 ns for GPON and to XGPON  $t_{rx}$  and  $t_{rx}$  obtained maximum value of 49.365 ps, SNR worth 25,9208 dB for GPON and 25,31344 dB for XGPON, and BER worth  $6,86 \times 10^{-29}$  for GPON and  $1,477 \times 10^{-20}$  to XGPON. This final project is also expected to provide recommendations for improving network capacity in the optical link to the Batununggal Regency from Cijaura STO.

**Keyword : GPON, XGPON, *triple play*, *downstream*, *upstream*, *Link Power Budget*, *Rise Time Budget*, SNR, BER**