

## ABSTRACT

This research aims to implement a *Fiber to the Building* (FTTB) system in Tokong Nanas Building, Telkom University, to improve connectivity and data capacity in accordance with the needs of students and lecture activities. The utilization of *Next Generation Passive Optical Network* (NGPON) technology also considers environmental and business aspects, as well as the potential for internet penetration in Indonesia. This solution is expected to improve internet services and provide benefits in *fiber optic* network planning by paying attention to Quality of Service (QoS) and *Bill of quantity* (BOQ) according to the required specifications.

Network quality improvement is carried out using NGPON technology. The implementation of this network starts from the Cijawura Automatic Telephone Center (STO) to the Tokong Nanas Building, using location and building mapping *software* through the two resilience paths of Kordon Market and Cikoneng. The workflow diagram includes several main components namely Central, ODC-CJA-FBL, ODC-CJA-FED, Mini OLT, ODC Zone 4, Optical Termination Box (OTB), Optical Distribution *Point* (ODP), *Switch*, and *Access point* in the building. *Duct feeder* cables from the Central Telephone Automation (STO) with a capacity of 288 cores, 96 cores, and 48 cores, are routed through two ODCs with a capacity of 48 cores to the Mini OLT at the Information Technology Center (PuTI). Furthermore, the *feeder* cable from the Information Technology Center (ITC) is routed to the Zone 4 ODC which has a capacity of 48 cores, then forwarded to the Optical Termination Box (OTB) on the ground floor of the panel room using a 1:4 splitter. The OTB connects the three ODPs on floors one, five and seven, and provides one spare core. The dropcore cable from the Optical Distribution *Point* (ODP) connects to the rosette and is forwarded to the *Switch* on each floor to be distributed to the *Access point* in each room using an *ethernet* cable or Local Area Network (LAN).

Based on the design of the central and Mini OLT, the Quality of Service (QoS) value obtained is in accordance with the eligibility standards with *Bit Error Rate* (BER)  $\leq 10^{-9}$ , *Signal to Noise Ratio* (SNR)  $\geq 21.5$  dB, *Q-Factor*  $\geq 6$ , and Link Power Budget below -28 dBm. Based on the *Bill of quantity* (BoQ), the cost of designing the *Next Generation Passive Optical Network* (NGPON) through the Kordon and Cikoneng Markets is Rp7.199.387.990,30 with a total *revenue* for 10 years of Rp66.948.188.836,00.

**Keywords:** NGPON, FTTB, Quality of Service, *Fiber optic*.