ABSTRACT

In the present era, technological advancements are rapidly progressing across various aspects of human needs. Particularly in the field of telecommunications, where we can easily exchange data and information through computer networks. Computer networks themselves consist of a series of interconnected computers. The computer network is transmitted by combining two nodes that need to pass through physical links such as copper cables, optical fibers, or wireless connections. The application of optical fiber cables has gained significant popularity due to their benefits as a transmission medium. Transmission channels made of thin glass or plastic fibers are commonly known as optical fibers. The potential development of optical fibers is applied in many sectors, one of which is optical ranging or distance measurement using optical fiber systems. Optical ranging is closely related to LiDAR, which is a method used to detect various parameters such as range, speed, and chemical constituents. The selection of optical fibers as a transmission medium requires a calculation known as the power budget. Several techniques have been applied in this LiDAR system, one of which is ToF (Time of Flight), or its term, time of flight. This method measures the distance between the sensor and the object. ToF operates by measuring the target distance by considering the time delay between the optical light transmitter and receiver. Meanwhile, the power budget is responsible for identifying and calculating losses in the system that will be evaluated. This final project attempts to apply power budget calculations using a target object, namely the Photodiode Power Sensor, illuminated by a laser diode through the Time of Flight LiDAR design method from a distance of 0-7 meters. In addition, the author also conducted simulations in Optisystem 7.0 to calculate the power budget. The power budget calculations calculated by the Optical Power Meter and Optisystem from a distance of 0 meter to 7 meters are indeed all exceeding -35 dBm. Where at a distance of 0 meters, the Optical Power Meter produces P_{RX} 11.253 dBm, reaching 9.507 dBm at a distance of 7 meters. Meanwhile, in the Optisystem simulation, starting from a distance of 0 m, it is 22.55 dBm, reaching 9.507 dBm at a distance of 7 meters. Therefore, it can be concluded that the power budget in the Time of Flight LiDAR system configuration measured by both the Optical Power Meter and the Optisystem simulation is considered good.

Keywords: *Power Budget, LiDAR, Loss, Time of Flight, Optisystem*