ABSTRACT

Radio over fiber (*ROF*) is a process of sending radio signals through fiber optic cables. Using a fiber optic cable, the quality of the transmitted voice signal remains good or can be said disturbance arising during the transmission process is small, so the signal is still good. Orthogonal Frequency Division (*OFDM*) is a multi-carrier modulation technique in wireless networks, *OFDM* has a single-carrier scheme to address unfiltered channel conditions with complex equalization. *ROF* and *OFDM* can be applied to support multimedia services such as internet, digital television, radio broadcasting and mobile communications. In the transmission process, the information will be changed line coding and in the modulation and then mounted on the optical source of the laser. Modulation process of the commonly used optical device is *Mach Zehnder Modulator* (*MZM*), while other optical *modulator* such as *Electroabsorption Modulator, Amplitude Modulator*, and *Phase Modulator* can be applied to optical transmission process.

In this final project, determine a system model that matches the standard device specifications of OLT, RF, *modulator*, ODC, ODP, ONT and RF de*modulator*. Then determine the research scenario according to the *modulator* used by *MZM*, EAM, AM and PM. then after that do the calculations and simulations on the *modulator* used, if it has been done then the performance test of the two results and compared the results of each simulation and calculation of the *Q Factor*, BER and *SNR* values. In addition, do a comparison on the simulation without using *OFDM* with a simulation using *OFDM*.

Calculations and Simulations have been performed on *ROF* system with full duplex-based *OFDM* method in Optical *Modulator* able to work on RF band 5 Ghz and 1 Ghz bit rate on *modulator MZM*, EAM, AM, and PM. With *Q Factor* value which only meets ITU-T standard that is *MZM* with value 8,97 in perancanaan and 6,891 at simulation and value BER $2.38\,x\,10^{-12}$ and $2.74\,x\,10^{-12}$ in simulation. Then the results of *MZM* with *OFDM* have *Q Factor* 6.89 with BER $2.74\,x\,10^{-12}$ while the design without *OFDM* has *Q Factor* 4.08 with BER $2.23\,x\,10^{-05}$.

Keywords: *OFDM*, *ROF*, Q-Factor, Bandwidth, LPB, RTB