ABSTRACT

The need for information exchange services that continues to increase must be balanced with improvements in the quality of telecommunications technology. Exchange of information with good quality requires fast and reliable transmission media such as fiber optics. One of the applications using fiber optic transmission media is the Radio over Fiber (RoF) system. The RoF system in its development can be combined with 5G mobile communication. From the results of this study, it is expected to be able to realize a 5G mobile communication with better quality.

To improve the transmission system in 5G mobile communication, the optical carrier in the RoF system which generally uses laser (light amplification by stimulated emission of radiation) will be replaced with Soliton pulses as a Radio Frequency (RF) signal modulator. The research will use software to simulate the RoF system. In the software simulation process, changes and calculations will be made on several test parameters, namely the bit rate used and the distance between the Central Office (CO) and Remote Access Unit (RAU) which is represented by the length of Single Mode Fiber (SMF) to get the maximum Bit Error Rate (BER) value of 10^{-9}, wide-open Eye Pattern, and minimum Q factor value of 6. In the results of this study, it is expected that the quality of the RoF system for 5G mobile communication can be improved by using Soliton pulses as an optical carrier in the RoF system.

This final project simulation is run with 4 scenarios. The results of the simulation show that the best value is in the first scenario with a bit rate of 1 Gbps, a Radio Frequency (RF) signal frequency of 2.5 GHz, a Soliton pulse frequency of 228.8 Thz, a Soliton pulse and Single Mode Fiber wavelength 1310 nm, which produces a Q factor value of 19.9286 and the Bit Error Rate (BER) value is 1.07441×10^{-88}, and the eye pattern is wide open.

Keywords: *Radio over Fiber, mobile communication 5G, Soliton pulse.*