

## ABSTRACT

*The communication system radio over fiber (RoF) is a process of delivery radio signals through fiber-optic cables, transmission using fiber-optic cables will be receive a large transmission speed than when through the transmission directly. Orthogonal Frequency Division Multiplexing (OFDM) is incorporation of many signals are orthogonal frequency, in the use of technology wireless system experienced many losses in the transmission of the signal and weakening of the atmosphere, to resolve these problems used on the system OFDM-RoF that has low attenuation, interface electromagnetic, and large bandwidth. Where the research was done by the design of the network scheme OFDM-RoF using external modulation on the up-conversion mechanism, direct detection method on the down-conversion mechanism and using 16-QAM modulation. This research focuses on the evaluation of the influence on system performance OFDM-RoF using external modulation with direct detection against the value of Bit Error Rate (BER), Signal to Noise Ratio (SNR), and from the constellation signal. The design of this simulation using software MATLAB R2010a and OptiSystem 14.1. To know the performance of a good performance the obtained received signal value SNR on the BER  $10^{-3}$  is 18.8112 dB, on the use of laser power 4 dBm with fiber length 10 km. Performance good for the constellation signal obtained in the use of laser power 8 dBm with fiber length 10 km, 30 km, 50 km.*

**Keyword** – RoF, OFDM, Matlab, OptiSystem 14.1, BER, SNR.