ABSTRACT

Currently, fiber optic communication as a transmission medium is widely used compared to electric cables, because optical fiber offers a more advantageous medium such as large bandwidth and high transmission speed for long distances, and is resistant to interference. Dense Wavelength Division Multiplexing (DWDM), is a transmission technology that uses light with different wavelengths as information channels, so that all wavelengths can be transmitted through optical fiber after the multiplexing process.

In this final project, we analyze the signal degradation due to the nonlinear effect of *Four Wave Mixing* (FWM) by varying *bitrate*. Furthermore, from these parameters, simulation and performance tests will be carried out on the DWDM network system by entering the distance *link*, channel spacing, *bitrate*, and signal transmission power in the software. In this study using a bitrate of 10,12,15 Gbps with a total of 4 channels.

Based on the results of the design and simulation, it shows that *bitrate* 10 Gbps with an optical fiber length of 287.83 km, and channel spacing of 1 nm, has the best performance with a *Q-factor* value of 6.61 and a BER of 1.448×10^{-11} , while the worst performance value is at *bitrate* 15 Gbps optical fiber length of 74.04 km, and channel spacing of 0.8 nm, with a value of *Q-factor*=2.81 and BER=1.449×10^{-03} . The non-linear effect of FWM becomes a major influence on the decline in DWDM performance in addition to the distance and *bitrate* parameters.

Key Word : *Dense Wavelength Division Multiplexing*, *Four Wave Mixing*, *Non-Linearitas*, *Bitrate*.