

## ABSTRACT

Dense Wavelength Division Multiplexing (DWDM) enables the delivery of many channels information in a single fiber-optic lines, but may allow the nonlinearity effect called Four Wave Mixing (FWM). FWM generates new signals at channel frequencies. The resulting signals can cause degradation of the DWDM channels.

Simulations have been performed in this thesis to see the effects of Four Wave Mixing in single mode fiber based ITU-T (International Telecommunication Union - Telecommunication Standardization sector) recommendation, the G.652 and G.655 in 1310 nm and 1550 nm wavelength region by using Matlab R2009a software. The research focused on FWM generated power and the impact on the Bit Error Rate (BER). The system is designed with a number of channel DWDM system combined with the same channel spacing, but the amount is varies. Fiber optics are used along 25 km.

From the simulation results, it is obtained that the FWM effect of G.652 fiber is relatively smaller than G.655 fiber at 1550 nm wavelength region. At 1310 nm wavelength region, the FWM effect of G.652 fiber is relatively larger than G.655 fibers. This FWM generated power does not affect the BER value in DWDM system designed. For all the conditions specified, BER  $10^{-5}$  is achieved for the value of Signal to Noise Ratio (SNR) 9.5 dB.

Keywords : *Dense Wavelength Dense Multiplexing, Four Wave Mixing, G.652, G.655, output power, Bit Error Rate, Signal to Noise Ratio.*