

## **ABSTRACT**

*The rapid development of technology makes many users need high-speed Internet which can be obtained using optical fibre services. DWDM (Dense Wavelength Division Multiplexing) technology that works by sending multiple signals on the same light wave using a variety of different wavelengths, can transmit data with a higher capacity with a long transmission link distance. However, long-distance DWDM link transmission has a higher chance of interference (loss) which can result in a decrease in the quality of the signal power to be received. Therefore, it is necessary to conduct research on how the effect of using an EDFA (Erbium-Doped Fiber Amplifier) Gain of 5-25 dBm on optical fibre network transmission for 8-channel DWDM applications. With a frequency of 193.1 - 193.8 THz, 100 GHz channel spacing, 10 dBm Laser Power, using a Bitrate variation of 10-20 Gbps transmitted along the 150 Km SMF fibre optic link with NRZ channel coding and APD Photodetector so that the Bit Error Rate and Q-Factor system performance parameters and the Receive Power Spectrum on the DWDM link can achieve good signal quality. Based on the simulated EDFA Gain and Bit rate variations, the design of the 8-Channel DWDM Network in this study is recommended using an EDFA Gain of 20 dB because at that Gain the most optimal BER, Q-Factor and Received Power Spectrum values are obtained which can transmit up to 18 Gbps Bit rate and meet ITU-T standards.*

**Keywords:** BER (Bit Error Rate), Bit Rate, DWDM (Dense Wavelength Division Multiplexing), EDFA (Erbium-Doped Fiber Amplifier), Gain, Loss.