

ABSTRACT

Based on the standards set by ITU-T G.989.1-G.989.3 the latest generation of PON is NG-PON2. NG-PON2 technology also has greater bandwidth and scalability by using a combination of Time Wavelength Division Multiplexing (TWDM). EDFA (Erbium Doped Amplifier) is one optical amplifier that can provide direct reinforcement of optical signals, but with additional noise. Noise amplified by EDFA amplifiers on TWDM downstream systems can result in poor signal performance because noise can occur in EDFA amplifiers.

This research was conducted with planning and simulation using NG-PON2 network with TWDM technique which has a total bitrate of 40 Gbps on the downstream link. The system is made using eight TWDM channels with each channel having a 5 Gbps bitrate. Then, the system planning is done by using 2 scenarios with the shortest transmission distance of 20 km and the furthest transmission distance of 40 km with three power divider points with a total split ratio of 1: 128. In addition, this system also uses EDFA as a booster amplifier that has a length of 1 to 5 meters with a Pump Laser Power of 10 mW to 100 Mw. After that, an analysis of the system is based on SNR, Q-Factor and BER measurement parameters. Furthermore, Gain analysis is performed on changes in EDFA length and pump power and Gain system analysis where the results of these parameters will affect the value of Noise Figure.

Based on the results of the simulation, it was found that using a 1 meter EDFA cable has the characteristics of Gain and Noise Figure which relatively increases when the Power Pump is 10-100 mW. Then the results of the performance simulation at a link distance of 20 km obtained Link Power Budget value of -6.06 dBm 81.37 Q-factor value, SNR value of 44.23 dB and BER value of 0. Whereas, the results of the performance simulation at a distance of 40 km link obtained values Q-factor 51.04 and BER value of 0.

Keywords: *Downstream, TWDM, NG-PON2, Noise Figure, Gain, Bit Error Rate, Q-factor, SNR, Link Power Budget, Rise Time Budget.*

