

ABSTRACT

In this day and age, optical fiber technology is in great demand for multimedia and data transmission media. Fiber optic fiber has a large bandwidth capacity and high speed. Optical fiber technology is now being developed, Next Generation Passive Optical Network 2 (NG PON2). NG PON2 was created to meet future broadband networks that are very high in demand. NG PON2 was standardized by the International Telecommunication Union – Telecommunications G.989 (ITU-T) G.989 series in 2015, aggregating 4 Optical Line Terminals (OLT) using Time-and-Wavelength-Division (TWDM) technology.

NG PON2 technology is proposed by the Full Service Access Network (FSAN) which has a 40 Gbps downstream speed by aggregating 4 Optical Line Terminals (OLT) with the TWDM technique. In the previous study, optical fiber G.652.C was used. In this study a NG PON2 network was simulated using the TWDM 40 Gbps technique in downstream using Highly Nonlinear Fiber (HNLF) and G.652.C transmission media. Then the data from the simulation results are analyzed by the effect of nonlinear effects that occur on both transmission media.

Based on data HNLF simulation, there is a nonlinear effect that affected performance result *Link Power Budget* (LPB), *Signal to Noise Ratio* (SNR), Q-factor and BER. The result obtained from 21 km with 32 ONU HNLF is LPB = -22,59 dBm, SNR = 24.57 dB, Q-Faktor = 12,53, BER = $1,7 \times 10^{-36}$. While for SMF LPB = -19,44 dBm, SNR = 28.30 dB, Q-Faktor = 19,83 BER = $7,47 \times 10^{-88}$. Whereas for 64 ONU HNLF obtain LPB = -23,49 dBm, SNR = 23.37 dB, Q-Faktor = 10,82, BER = $9,78 \times 10^{-28}$ for SMF is LPB = -19,72 dBm, SNR = 27.21 dB, Q-Faktor = 19,25, BER = $5,36 \times 10^{-83}$, difference that occurs in both transmission media is caused by FWM. Factors affecting FWM are from the cable parameter HNLF which is calculated to get P_{fwm} of -86.64 dBm.

Kata Kunci : TWDM, HNLF, NG PON2, Effect Nonlinear, Four Wave Mixing.