ABSTRACT

In the current era, optical fiber technology has improved the development to meet the needs of its users. Optical fiber technology has achieved the ability to send data with a 10 Gbps bitrate. However, the development of this technology continues to be carried out and now it arrives at the ability to send data with a 40 Gbps bitrate called Next Generation Passive Optical Network 2 (NG-PON2) technology.

Time and Wavelength Division Multiplexing (TWDM) is a multiplexing technique standardized by International Telecommunication Union Telecommunication Standardization Sector (ITU-T) for NG-PON2 technology. While line coding of NG-PON2 uses various line coding and it can affect quality of transmitted signal. To find out the good line coding, the author analyzed the effect of various line coding on the performance of NG-PON2 network using multiplexing technique of TWDM. In the simulation process, several scenarios are carried out in it. In the first scenario, line coding is changed, with type of Return to Zero (RZ), Non-Return to Zero (NRZ), Return to Zero-Differential Phase Shift Keying (RZ-DPSK) and Return to Zero-Differential Quadrature Phase Shift Keying (RZ-DQPSK). The second scenario concerns about the change of link range starts from 10, 20, 30, until 40 km.

Based on simulation result, the best line coding is RZ-DQPSK with better performance compared to others line coding. RZ-DQPSK on 10, 20, 30 and 40 km bring Link Power Budget (LPB) out about -16, 353 dBm, -19,854 dBm, -23,354 dBm, and 26, 853 dBm. Value of Signal to Noise Ratio (SNR) about 41,419956 dB, 36,099789 dB, 31,616630 dB and 26,448934 dB. Quality Factor (Q-Factor) about 58,8800, 31,9124, 19,0459 and 10,5055. And Bit Error Rate (BER) value 0, 8,363× 10^{-224}, 3,39693× 10^{-81} and 4,05714× 10^{-26}.

Keywords: *line coding*, NG-PON2, TWDM, optical fiber communications.