

ABSTRACT

Modern optical fiber technology is capable of transmitting data at speed of over 10 Gbps. The technology at development is NG-PON2, which is defined to perform at speed of more than 10 Gbps. NG-PON2 technology was initiated bearing in mind that future communication technology requires a much larger bandwidth.

Optical modulator is used to superimpose information signal onto carrier signal in light pulses, so the information could be transmitted to the intended destination. Most commonly used type of modulator is Mach-Zehnder Modulator (MZM) and Electro-Absorption Modulator (EAM). This study analyses the performance of each modulators using various formats of modulation, namely Non Return to Zero (NRZ), Return to Zero (RZ), Return to Zero-Differential Phase Shift Keying (RZ-DPSK) and Return to Zero-Differential Quadrature Phase Shift Keying (RZ-DQPSK). The simulation is conducted on scenarios of at bitrate of 40 Gbps and length ranging from 5 km until 20 km with 1 km step between lengths. The optical modulator performance parameters are LPB, SNR, BER, and Q-factor. Optisystem is aiding the simulation processes on the modulators performance with various formats of modulation.

Based on the simulation results, the best achieved power received values are of -17,569 dBm attained at 5 km and of -21,83 dBm attained at 20 km, SNR of 26,742 dB attained at 5 km and of 17,7261 dB attained at 20 km, Q-factor of 13,0516 attained at 5 km and of 6,0598 attained at 20 km, BER of $3,2033 \times 10^{-39}$ attained at 5 km and of $6,4308 \times 10^{-10}$ attained at 20 km. Based on the values, Electro-Absorption Modulator using NRZ modulation format yields performance values above the quality parameters standard, hence suits the NG-PON2 technology.

Keyword : NG-PON2, MZM,EAM, Modulation Format