

ABSTRACT

At this time, optical access networks are becoming one of the technologies that are constantly being developed as they have advantages over bandwidth capacity and bit rate. One of them is Passive Optical Network (PON). Next Generation Passive Optical Network stage 2 (NG-PON2) is becoming the latest development of PON technology that can transmit information at speeds of ≥ 40 Gbps for downstream and 10 Gbps for upstream side. The use of TWDM technique with OLT aggregation method on NG-PON2 can be the future broadband network solution.

In this research, NG-PON2 network simulation is done by comparing Erbium Doped Fiber Amplifier (EDFA) and Raman Optical Amplifier (ROA) using software. The simulation uses four TWDM channels with a total bit rate of 40 Gbps on the downstream and 10 Gbps for upstream. The network simulation uses 1:256 splitting ratio with the farthest transmission distance is 60 km. The first scenario simulation is performed on the downstream transmission by adding an optical amplifier as a booster amplifier. The second scenario is simulated on the upstream transmission by adding the optical amplifier as a pre-amplifier.

Based on the simulation results, the best optical amplifiers in downstream transmission are EDFA with received power value is -23.99 dBm, SNR = 27,46 dB, Q Factor = 14,58, and BER = $2,85 \times 10^{-47}$, while on ROA produce received power value is -23,98 dBm, SNR = 27,27 dB, Q Factor = 14,36, and BER = 3.97×10^{-47} . In upstream transmission, EDFA also produces better performance with received power value is -24.16 dBm, SNR = 23.90 dB, Q Factor = 10.75, and BER = 2.76×10^{-27} , whereas in ROA produce received power value is -24.16 dBm, SNR = 22.56 dB, Q Factor = 9.49, and BER = 1.07×10^{-21} . Based on these values, EDFA amplifier is superior when implemented on NG-PON2 system based TWDM – PON.

Keywords : *Optical amplifier*, PON, NG-PON2, TWDM, EDFA, ROA.