

ABSTRACT

Passive Optical Network (PON) is one of the technologies that become the solution for the needs of people who want a fast and efficient technology. The next generation of PON is Next Generation Passive Optical Network stage 2 (NG-PON2) can transmit data speed with bitrate ≥ 40 Gbps for downstream side and 10 Gbps for upstream side. TWDM is recommended as the ultimate solution for designing and implementing NG-PON2.

This research design and simulate bidirectional NG-PON2 network with TWDM technique which has total bitrate 160 Gbit / s for downstream and 80 Gbps for upstream is done. The system created using sixteen TWDM channels with each channel has a 10 Gbit / s bitrate for downstream and 2.5 Gbit / s for upstream. Then, this system has 40 km transmission distance with three power divider points with a total split ratio of 1: 128. In addition, the system also uses the addition of EDFA as a booster amplifier and pre-amplifier that has a length of 1 to 5 meters with a Power Laser Pump of 100 mW up to 1000 mW. After that, analysis of the system based on measurement parameters such as Power Received, Q factor and BER. Also, amplifiers were analyzed for EDFA length changes and laser pump power with Gain and OSNR measurement parameters.

Based on the simulation results, downstream transmission obtained 2 meter long EDFA with 700 mW pump power to give the best performance with Q factor parameters is 18.59; BER is 1.9×10^{-77} ; Power Received at -18.61 dBm; Gain is 10.86 dB; And OSNR is 54.29. On the other hand, for performance on upstream transmission is showed by length of 2 meter EDFA using pump power 800 mW with Q factor equal to 19,67; $5,6 \times 10^{-85}$ of BER; Power Received at -15,16 dBm, 14,18 dB of Gain and 25.69 of OSNR.

Keywords: PON, NG-PON2, TWDM, EDFA, *Booster Amplifier, Pre-Amplifier*