

## ABSTRACT

This research has shown a summary of the ideas and principles of network access NG-PON system and some methods used for improvements, such as adding Dispersion Compensation Fibre (DCCF) wires on side Optical Line Terminal (OLT) and the application of the Arrayed Waveguide Grating (AWG) for configurable wavelength. The influence of both parameters were analyzed through calculations and simulations.

The first result of this research was using stacked 4 OLT with an aggregate 40 Gbps, transmitted on fibre SMF and DCF by comparing the system without DCF cable. On the condition of minimum standards, the range of 40 km with a power splitter 1:64, only 9.01% power difference while the increased in the Q factor of 65.5%. With these results, it can be said that systems using DCF can be used optimally. In addition, with the power splitter 1: 4 and a lower power worth 0 dBm can produce a range of 150% further. With the same distance as far as 40 km, this research increasing power splitter 6 times increase compared with previous research.

The second result of this research using arrayed waveguide Grating (AWG), which will be one point on a cost-compression. AWG made with the temperature dependence, which Silica-doped substrate made widening the bandwidth AWG has a value of 0.1 nm/°C. AWG output if you want to get four wavelengths was 65°C, three wavelengths with 60 °C, two wavelengths 50°C and one wavelengths using room temperature. The results of these outputs Q factor has a value of 5.71 with four wavelengths. The number of wavelengths down asymmetrically, with a decrease in the number of wavelengths. However, further research of these studies will optimize the system so that the Q factor of the number of wavelengths in each gain value Q factor of more than 6.

Based on the empirical method optimization, it was determined that the value of power transmit is 9 dBm. However, the results of this optimization is not ideal, because the bit rate of 10 Gbps is below standard Q factor, then the author's suggestion when ISP / internet providers will provide a bit rate of 10 Gbps, do not use the system AWG. However, the conventional system using TDM. This study is much lower in power usage, rather than planning workshop NG-PON2 ITU-T / IEEE