Investigation of EDFA performance in 8 channel WDM transmission system.

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Erbium Doped Fiber Amplifier (EDFA) obtained a wide range of scientific and commercial applications in optical fiber communication systems.It has been considered as an attractive solution because of several major advantages - low loss optical window of silica based fiber (1525-1565 nm),high energy efficiency (more than 50 %) and time constant enough to cover modulation noises.However, the presence of amplified spontaneous emission (ASE) limits the peak gain.EDFA gain spectrum is wavelength dependent and it applies as SNR differential between channels after passing through a cascade of EDFA [1, 2].

In this report the performance of an EDFA in a 40 Gbit/s 8 channel DWDM transmission system with NRZ-OOK modulation format and 100 GHz channel spacing was investigated.The experimental part was focused on optimization of EDFA parameters.Optimal length depends on doping level and pump power, therefore different doped fiber lengths (10m, 15m, 20m, 25m, and 30m) and excitation source power (200mW, 300 mW, 400mW ,500 mW) were used in order to reach the highest amplification value (see Fig.1). Gain was measured at each DWDM channel.

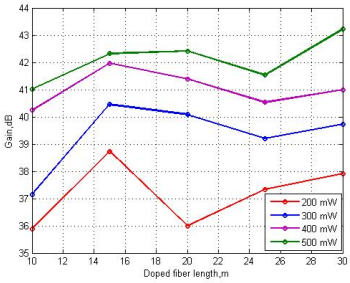

Figure 1: Gain plot depending on the doped fiber length for each pump power is displayed for the 8 channel DWDM transmission system

The obtained results have shown that at the pump power of 400 mW and 500 mW EDFA has already reached its saturation regime and gain is almost constant: 41-42 dB. The highest gain of 43 dB was got if doped fiber length is chosen to 30m. In order to reach higher gain values longer fibers and more powerful excitation sources should be used.

References

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