Faculty of Electrical Engineering & Computer Science
Master Degree Course Electronics Engineering, MSc EE

HOCHSCHULE BREMEN
UNIVERSITY OF APPLIED SCIENCES

Master 2013

Dipendra Poudel & Bhaskar Khanal

Development and Assembly of an Optical Fiber Amplifier for L-Band Operation.

ABSTRACT - Masterthesis

Erbium doped fiber amplifier (EDFA) is an indispensable element in an optical fiber communication system. With the rapid growth of all optical and high-speed networks, the gain bandwidth of a conventional C-band EDFA cannot satisfy the requirement of a DWDM System. Moreover, the gain of each channel will change dynamically with the network reconfiguration for a uniformly broadened EDFA, which will finally influence the stability of the communication system. Thus, a development of L band EDFA is a big necessity in order to maintain the power of the signals over the fibers, especially in long distance networks.

In this thesis, applying the 980 nm bi-directional pumping configuration we investigate the amplification characteristics of L-band (1565-1625 nm) erbium-doped fiber amplifier (EDFA). L-Band EDFAs are attractive because the use of L-band and C-band (1530-1560 nm) EDFA in parallel greatly expands the amplification wavelength region. We adjusted the length of erbium-doped fiber (EDF) to achieve the flat amplification characteristics in the 1573-1600 nm wavelength region without using gain equalizers. The L-band EDFA exhibited a signal gain of 22 dB with good uniformity (less than 1 dB change of signal gain) and a noise figure of 6.9 dB for a 1580 nm Signal of 40-channel WDM System. We also used the simulation tools to investigate the characteristics of L-band EDFA with the same configuration. The simulation results quite agree with the experimental data.