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EFFECT OF OPTICAL AMPLIFICATION AND OPERATING WAVELENGTH ON THE PERFORMANCE OF THE 4-PAM DATACENTER INTERCONNECTS

Duha Sabah Ahmed and Raad Sami Fyath
Al-Nahrain University, Iraq

The aim of this work is to investigate the transmission performance of 4-PAM datacenter interconnects operating at 1310 and 1550 nm wavelengths with and without optical amplification. The transmission of the PAM pulses on the fiber is modeled using nonlinear Schrodinger equation taking into account the standard single-mode fiber linear characteristics (attenuation and dispersion) and nonlinear characteristics (Kerr effect and related self-phase modulation). Six scenarios describing the environment of three links operating with and without Er-doped optical amplifiers are investigated, namely 1310 nm link, 1550 nm link without dispersion compensation scheme, and 1550 nm link with dispersion compensation fiber (DCF). The investigation is supported by analytical results and simulation ones obtained using Optisystem software ver. 15. Figures 1a and 1b show the maximum transmission distances corresponding to these six scenarios operating with bit rates 112 and 224 Gbps and with 0 dBm launch power. The results reveal that the amplified 1310 nm link can support medium reach applications even at 224 Gbps and 0 dBm launch power. Designing the 1550 nm link with both fiber loss and dispersion is useful for medium-reach applications even at 224 Gbps and 0 dBm launch power. However, the maximum reach L_{max} is less than of the amplified 1310 nm link, (L_{max} is reduced by about 30% and 60% for 112 and 224 Gbps bit rate rates, respectively).

duhasabah94@gmail.com

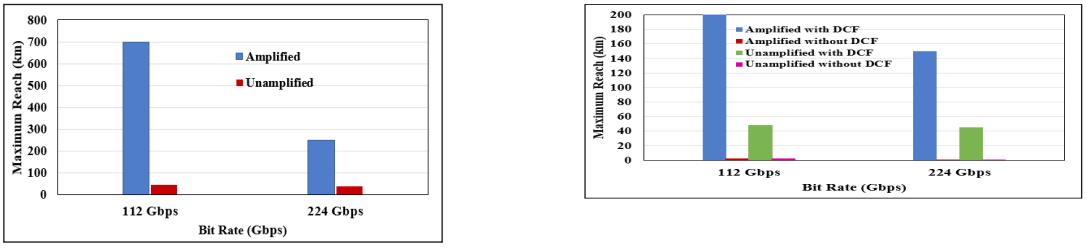

Figure 1: Maximum transmission distances for various link scenarios and for bit rates 112 and 224 Gbps at 0 dBm launch power (a) 1310 nm (b) 1550 nm