

Influence of Chirp of High-Speed Laser Diodes and Fiber Dispersion on Performance of Non-Amplified 40-Gbps Optical Fiber Links

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Abstract : We model and simulate the combined effect of fiber dispersion and frequency chirp of a directly modulated high-speed laser diode on the figures of merit of a non-amplified 40-Gbps optical fiber link. We consider both the return to zero (RZ) and non-return to zero (NRZ) patterns of the pseudorandom modulation bits. The performance of the fiber communication system is assessed by the fiber-length limitation due to the fiber dispersion. We study the influence of replacing standard single-mode fibers by non-zero dispersion-shifted fibers on the maximum fiber length and evaluate the associated power penalty. We introduce new dispersion tolerances for 1-dB power penalty of the RZ and NRZ 40-Gbps optical fiber links.

Keywords : bit error rate, dispersion, frequency chirp, fiber communications, semiconductor laser

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