Abstracts

Optical Data Synchronization Using Tunable Transmitters and Nonzero Dispersion Links

P. Blixt, J.E. Bowers, E. Bodtker, O. Sahlen and R.S. Smith. "Optical Data Synchronization Using Tunable Transmitters and Nonzero Dispersion Links." 1995 Transactions on Microwave Theory and Techniques 43.9 (Sep. 1995, Part II [T-MTT] (Special Issue on Microwave and Millimeter Wave Photonics)): 2214-2221.

A new digital feedback loop for synchronizing optical data with a clock at an arbitrary point in a fiber-optic link has been experimentally demonstrated and its physical limitations have been analyzed. The feedback loop consists of a tunable transmitter, a nonzero dispersion link, and standard microwave and digital electronics. The feedback loop was able to suppress thermal fluctuations with an accuracy better than 1 ps using either a temperature tuned DFB laser diode or a current tuned DBR laser diode. No bit-error rate penalty was measured during closed loop operation compared to back-to-back transmission. The physical limitations of the loop stem from noise in the receiver and the actuator increment. Thermally induced phase fluctuations in the fiber at frequencies above the loop bandwidth were found negligible. The maximum experimental delay time for stable operation was 0.86 s, indicating the possibility of closed loop operation for very long fiber links. The feasibility of packet synchronization is discussed. Moreover, a new scheme is proposed to circumvent wavelength reset when the system approaches the operating boundaries.

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