Abstracts

An Analytic and Experimental Comparison of Direct and External Modulation in Analog Fiber-Optic Links

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Analytic lumped-element small-signal models of directly and externally modulated analog fiber-optic links have been derived. Incremental modulation efficiency is defined and used to compare the performance of these modulation techniques. In experiments to optimize link RF-to-RF gain and noise figure, the measurements obtained agreed with calculations to within /spl ap/ 1 dB. The externally modulated link was operated with two different impedance matching circuits. With a low-pass match the bandwidth was 150 MHz, and the link transducer gain was 1 dB with a band-pass match the bandwidth was 22 MHz, the link transducer gain was 11 dB, and the noise figure was 6 dB. The directly modulated link was operated with a low-pass match. in this case, the bandwidth was 1 GHz, the link transducer gain was -14 dB, and the noise figure was 33 dB. These experimental results were achieved with no amplification and represent a significant improvement in performance over previously reported analog fiber-optic links.

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