Laser linewidth requirements and improvements for coherent optical beam forming networks in satellites - DTU Orbit (28/12/2018)

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A coherent optical beam forming network using phase-locked semiconductor lasers as sources is presented. For this scheme the spectral purity of the intermediate frequency derived from mixing the signals from two semiconductor lasers is considered. The relationship between the linewidths of the lasers in a satellite transmitter and the phase error at the detector of a microwave differential quaternary phase-shift keying earth station receiver is analyzed. The demands placed on the linewidths from the point of view of phase stability requirements are calculated using quaternary phase-shift keying modulation at data rates of 33 and 131 Mb/s. It is shown that a substantial improvement in performance can be achieved when phase locking the two lasers to each other is feasible.

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