

**“Upgrading multimode channels for multi-Tb/s/inch bandwidth densities in board-level optical interconnects”**, pp. 222 - 228

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**Abstract** – To keep up with the increasing demand for data rate in high-end servers, and especially in configurations encompassing e.g. symmetric multi-processor (SMP) systems, I/O memories and ultra-fast system bus links, board-level optical interconnects have become increasingly important even for very short link topologies “inside the box” being typically in the range of 10 cm that may scale up to several meters. Merging optical waveguide technology with state-of-the-art printed circuit board (PCB) production is reliable only if the involved waveguide cross sections are of considerably large extent, leading to a highly overmoded optical transmission channel. As in mobile communications, such “problematic” channels are prone to be exploited by advanced transmission schemes based on multipleinput multiple-output (MIMO) communications. We present the idea of an optical MIMO channel by having more than one laser source at the input and a detector array at the output. With proper tailoring of the underlying mode group multiplexing mechanism, aggregate data rates in the multiple 10 Gb/s range may be achievable supporting bandwidth densities of 10 Tb/s/inch already with present optical interconnect technologies.