

Optical Sideband Modulation in Silicon Photonics Platform Using Mach-Zehnder Interferometers

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Abstract— Optical sideband modulation is a useful technique used in applications like radio-over-fiber (RoF) systems for compensation of chromatic dispersion, wavelength division multiplexing and even LiDAR. Sideband can be modulated in different ways depending on the required application. In this paper, we present and compare different sideband modulation methodologies which offer advantages in terms of reduced fabrication complexity, better carrier suppression and, efficient sideband, carrier and higher order sideband suppression ratios. Optical sideband modulation using interferometers like Mach-Zehnder Interferometer (MZI) offer advantages over techniques like optical filtering because their operation is independent of frequency. We present modulation techniques using single dual-drive MZM (DD-MZM) dual-parallel single-drive MZM, dual-parallel dual-drive MZM (DP DD-MZM) with 2 RF modulation signals and dual-parallel dual-drive MZM with 4 RF modulation signals, in simulation.

Keyword— Optical sideband modulation, Double sideband modulation, Single sideband modulation, Single sideband suppressed carrier modulation, Silicon photonics.



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