Combined Optical and Electrical Spectrum Shaping for High-Baud-Rate Nyquist-WDM Transceivers - DTU Orbit (08/11/2017)

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We discuss the benefits and limitations of optical time-division multiplexing 22 (OTDM) techniques based on the optical generation of a periodic train of sinc pulses for 23 wavelength-division multiplexing (WDM) transmission at high baud rates. It is shown 24 how the modulated OTDM spectrum bandwidth is related to the optical comb parameters 25 and the pulse shaping of the modulating waveforms in the electrical domain. Such de- 26 pendence may result in broadening of the modulated spectra, which can degrade the 27 performance of Nyquist-WDM systems due to interchannel crosstalk penalties. However, 28 it is shown and experimentally demonstrated that the same technique of optical pulse 29 train generation can be allied with digital pulse shaping to improve the confinement of 30 the modulated spectrum toward the Nyquist limit independently of the number of OTDM 31 tributaries used. To investigate the benefits of the proposed approach, we demonstrate 32 the first WDM Nyquist-OTDM signal generation based on the periodic train of sinc pulses 33 and electrical spectrum shaping. Straight line transmission of five 112.5-Gbd Nyquist- 34 OTDM dual-polarization quadrature phase-shift keying (QPSK) channels is demon- 35 strated over a dispersion uncompensated link up to 640 km, with full-field coherent 36 detection at the receiver. It is shown that such a design strategy effectively improves the 37 spectral confinement of the modulated OTDM signal, providing a minimum intercarrier 38 crosstalk penalty of 1.5 dB in baud-rate-spaced Nyquist-WDM systems.

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