Bachelor / Master Thesis:

Spectrally-sliced optical arbitrary-waveform measurement (OAWM) at O-band

Karlsruhe Institute of Technology

Spectrally-sliced optical arbitrary waveform measurement (OAWM) has emerged as a promising solution for testing next-generation high-speed optical transceivers. By decomposing ultra-broadband optical signals into multiple spectral slices, the resulting narrowband signal components can be coherently detected in parallel using a coherent receiver array. In this approach, phase-coherent comb lines serve as multi-wavelength local oscillators, and the individual spectral slices are digitally stitched together to reconstruct the original optical waveform. Many experimental demonstrations have been reported in recent years. However, they are so far limited to the C-band commonly used for long-haul transmission. In contrast, the O-band is gaining increasing importance for data-center interconnects due to its low chromatic dispersion. Therefore, developing an OAWM system operating in the O-band is of significant interest.

Your tasks:

- Assist in building the OAWM system
- Investigate the optimal optical equalization filter for IMDD signals
- Perform experimental characterization and verification of the system

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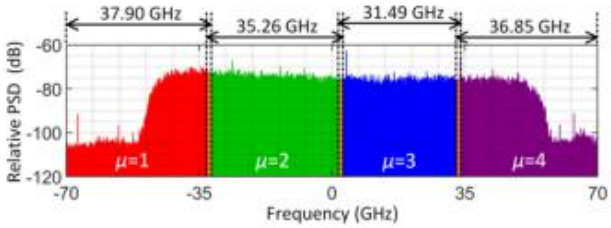
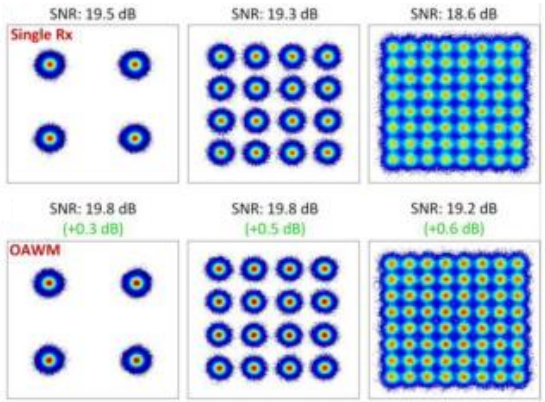
Reconstructed spectrum from 4 slices



Conventional reception vs OAWM reception



For OAWM-based reception, we observe slightly improved constellation-SNR performance for various 100 GBd QAM data signals, while the electronic acquisition bandwidth requirements of the individual ADC are greatly reduced.

Source: D. Fang et al., "Optical Arbitrary Waveform Measurement (OAWM) Using Silicon Photonic Slicing Filters," J. Ligtw. Technol. 40, 1705 (2022)