Master Thesis

Setup and Analysis of a Coherent SDM/DWDM Experiment using Optical Frequency Comb Generators

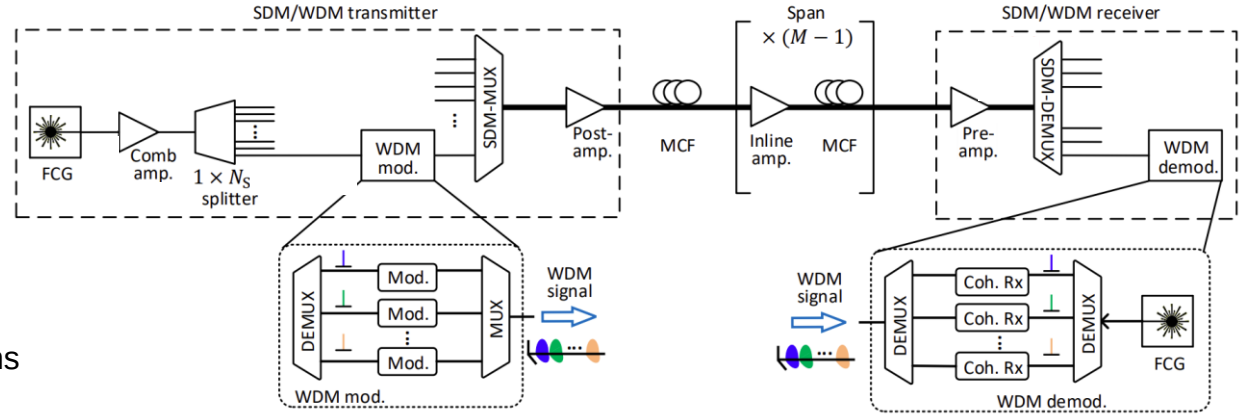
In a few years, we will reach the point where the capacity of a single network router port will be equivalent to that of a full wavelength-division-multiplexed (WDM) system (C-band + L-band). Consequently, space-division-multiplexing (SDM) and spatial path switching will gain in importance, whereas single wavelength switching and laser tunability will lose relevance. To reduce the transceiver cost of such a system, a laser comb shall be used as an "optical power supply", which supplies a multitude of optical transmitting and receiving units and shall replace individual laser sources.
In this thesis, a comb-based coherent SDM/dense-WDM (DWDM) experiment will be set up, employing a multi-core optical fiber (MCF). To compensate for crosstalk between the fiber cores, multiple-input multiple-output (MIMO) equalizer techniques will be investigated and implemented at the digital coherent receiver. Finally, the performance limitations of the system will be studied.

Tasks:

- Setup of the experiment in the lab
- MIMO-DSP for signal equalization
- Evaluate performance limitations of the system

Requirements:

- Experience in MATLAB or Python
- Knowledge in (optical) communications



Coherent SDM/DWDM system using optical frequency comb generators. The laser frequency comb is distributed to all spatial wavelength channels by a DEMUX. After modulation of each channel, they are recombined by a MUX and coupled into a multi-core fiber (MCF). On the receiver side, DEMUX components split the signal back into their respective spatial wavelength channels, which are individually coherently detected. Due to the physical relationships of the individual spatial optical signals, a MIMO-DSP can be applied.

Interested? For more information contact:

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