Bachelor/Master Thesis

Real-time Digital Signal Processing for Optical Communication

With higher symbol rates and power efficient optical transceivers, the DSP design of powerful and hardware efficient algorithms has become a key factor in optical transmission systems. For the validation of new DSP concepts, FPGAs are the preferred hardware platform. Operating at a few hundreds of megahertz, a major challenge is the implementation of signal processors that are able to deal with tens to hundreds of gigasamples per second. By parallelizing the algorithm structure, it is possible to process such high data rates, while at the same time placing high demands on the computational complexity. In the framework of a thesis, DSP algorithms of a digital coherent system will be analyzed, implemented and demonstrated on a high-end FPGA. The exact DSP modules and work can be adapted to the interests of the student.

Fig. 1 Signal processing modules in optical communications

Tasks:

- Analysis & simulation of DSP algorithms in MATLAB
- Hardware design & verification with VHDL
- Hardware implementation using a Xilinx FPGA chip
- Experimental demonstration in an optical communication setup

Fig. 2 Experimental setup to demonstrate the developed real-time algorithms. Two FPGAs for the transmitter and receiver respectively.

Interested? For more information contact:

Patrick Matalla, M. Sc.
patrick.matalla@kit.edu
Tel. 0721-608-42487

Salek Mahmud, M. Sc.
md.mahmud@kit.edu
Tel. 0721-608-47173

Prof. Dr. Sebastian Randel
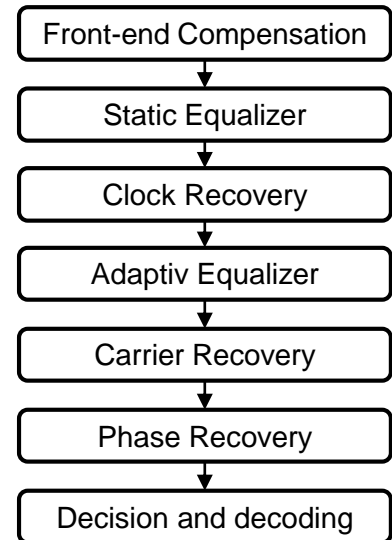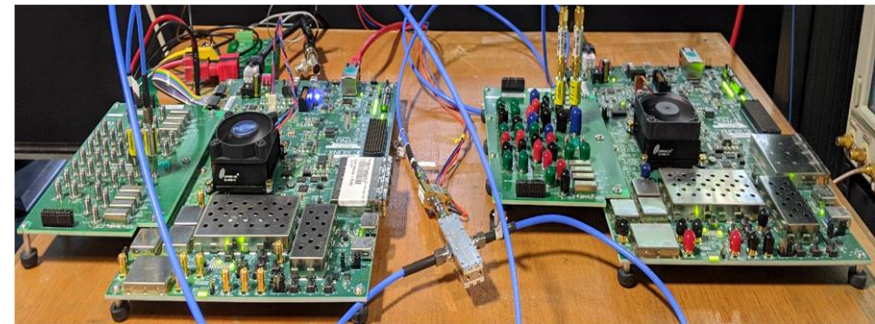sebastian.randel@kit.edu
Tel. 0721-608-42490

IPQ
Institute of Photonics and Quantum Electronics