Elektrotechnischen Kolloquium

Thema: **DSP based CD and PMD Equalization Techniques in PDM-QPSK and PDM-16-QAM Receivers**

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Abstract:

Digital coherent fiberoptic transmission employing polarization-division multiplexing (PDM) along with the quadrature amplitude modulation (QAM) techniques, QPSK (quadrature phase shift keying) and 16-QAM, enhances spectral efficiency of optical networks. In this respect, polarization diversity coherent receiver gives a representation of the optical field in the electrical domain. This facilitates efficient digital signal processing (DSP) based compensation of fiberoptic transmission impairments. The signal quality is significantly impaired in long-haul transmission fiber links at a high symbol rate because of chromatic dispersion (CD) and polarization mode dispersion (PMD). A two-stage equalization approach is needed for efficient compensation of these channel impairments in the digital domain. In the first stage, CD compensation and estimation is required for uncompensated links with large amount of CD. Furthermore, as second stage, multiple-input multiple-output (MIMO) equalization is required for PMD and residual CD compensation. In this work, robust DSP tools have been proposed based on the simulation results and performance analysis of 112 Gb/s PDM-QPSK and 224 Gb/s PDM-16-QAM systems. In this perspective, this work contributes the following:

- Efficient DSP based CD equalization has been investigated and optimized.

- DSP based CD compensation methods have been extended to be adaptive as per the requirements of modern dynamic channel switching concept.

- Improved MIMO equalizers have been proposed and investigated for the compensation of PMD and residual CD.