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Elektrotechnik-Elektronik-Informationstechnik

EEI KOLLOQUIUM

Through-the-Grid: Power Line Communication Based Power Grid Tomography

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Diskussionsleitung: Prof. Dr.-Ing. R. Schober

Power line communications (PLC) is one of the communications technologies deployed for the support of smart grid applications. Since it reuses the existing grid infrastructure, it offers cost advantages over alternative communications methods and gives electric utilities control over the communications medium. Furthermore, the ``through-the-grid" property of PLC extends its possible use beyond mere communications. Since the PLC signals are bound to travel through the power grid, they can also be used for inference tasks, such as online diagnostics of power line integrity.

In this seminar, we present a new inference application of PLC, enabled by modern signal processing: Grid Tomography. That is, we assume that PLC devices are deployed at the edges of a grid, for primary purposes such as advanced meter reading, and we (re)use them to retrieve the physical power-grid topology, i.e., the connections and lengths of power lines reaching to the locations of the PLC devices. To this end, we propose the combination of PLC-based ranging with inference based on end-to-end measurements. In the context of communication networks, the latter is known as tomography. Our simulation results demonstrate the successful and accurate reconstruction of grid topologies by the proposed power grid tomography method.