



KOLLOQUIUM

Institut für Elektrotechnik, Elektronik und Informationstechnik

Low Power Consuming Radio Frequency Integrated Circuits for High-Speed Communications

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

The demands for data rates of wireless and wired systems are continuously growing making the design of the RFICs challenging, e.g. regarding operation frequencies, bandwidths, power consumption and circuit understanding. Playing with CAD tools in piecemeal fashion and hoping for record results is frequently not sufficient any more. Precise, theoretical circuit analyses are very helpful to get a deep understand of the circuit subsequently allowing for efficient CAD optimizations. Moreover, enhanced RF circuit architectures and advanced IC technologies have to be considered. With focus on the corresponding achievements at CCN, these issues are addressed in this talk.

First, millimeter wave CMOS and SiGe circuits, such as a 60 GHz quadrature VCO and a 0.1-60 GHz broadband distributed LNA are discussed. For the VCO, a rigorous theoretical small signal circuit analysis methodology is presented.

Second, the results of C-band RFICs for adaptive antenna combining including amplifiers with innovative compensation of phase variations versus gain control, and compact 360° phase shifters with continuous control are treated.

Third, we discuss highly efficient and broadband C-band CMOS power amplifiers, e.g. a 17 dBm C-Band class-F PA with 45 % efficiency at only 1.5 V supply. Moreover, adaptive biasing concepts with back-off power sensing and novel dc/dc converter architectures are presented. Such concepts are instrumental for decreasing the power consumption in future wireless systems.

Last but not least, we outline the performance of some of our broadband RFICs for high speed optical communication, e.g. a low power consuming 40 Gb/s transimpedance amplifier.