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Institut für Elektrotechnik, Elektronik und Informationstechnik

Concept of a Frequency Agile Basestation System Supporting Technologies and System Analysis

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

Classically basestation design is devoted to operation of a single mode, which means a single air interface standard at a single frequency band. But the request for flexible basestations is rising. Flexibility of a basestation has two main aspects: a) Flexibility in terms of air interfaces – this is called Multistandard capability, b) Flexibility in terms of frequency bands – this is called Multiband capability. A mode of a radio is therefore understood as a combination of a certain air interface standard and a certain frequency band.

Frequency Agility is a term that is settling in literature and reflects the ability of a system to be reconfigurable to enable operation at multiple Frequency bands. Therefore Frequency Agility is part of Software Radio Technology.

The concept of a frequency agile basestation system and the underlying technologies that facilitate such a concept are presented. The talk therefore will address recent advances in the area of system architecture, antenna technology, reconfigurable RF processing, and conversion techniques.

Based on an analysis methodology that allows assessment of complexity in analog and digital domain based on a common metric, the receivers and transmitters processing chain is analyzed and trade-offs between analog and digital processing are visualized.

As a result of the analysis methodology it shows up that the classical paradigm of shifting all processing from analog to digital is not reasonable given the system requirements. Setting the right point for conversion from analog to digital is a point for optimization. Criteria for finding this optimal trade off will be given.

A challenge in the context of frequency agility is how to realize reconfigurability in the analog RF domain in an efficient manner. Here RF-MEMS is an emerging technology that allows alteration of the properties of an analog RF chain through micro mechanical switches and variable passives at a microscopic scale.

With respect to reconfigurable power amplifiers new wide band gap RF power device technologies like SiC-MESFET and GaN-HEMT offer more linear operation due to less thermal and electrical memory effects and at the same time higher impedance level.

Finally a second methodology to analyse the basestations systems performance based on above technology assets with respect to the radio link is presented.

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