

# A Study on Space-Time Processing of Downlink DS/CDMA Communication System

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## ABSTRACT

This thesis aims to propose a family of downlink space-time processing (DSTP) techniques for downlink DS/CDMA system. In the proposed structure, array of antennas are applied in the basestation and single antenna is applied in each mobile. Thus, downlink channel can be regarded as a multi-input single-output (MISO) system. Spatial processing is realized by a basestation downlink beamformer while temporal processing is performed in each desired mobile. We derive various downlink beamforming weights and temporal processors to meet different criteria such that multiple access interference (MAI) is removed and signal-to-interference-plus-noise-ratio (SINR) is maximized at mobile receiver. We also conduct the analysis in multipath environment and overloaded system (the total paths or the numbers of user have exceeded the array size). The simulation results, demonstrate that the proposed method can eliminate multiple access interference efficiently. Consequently, it enjoys the near-far resistant characteristics. Furthermore, the issue of power assignments for each subscriber is also considered in this thesis. We design the downlink beamforming weights under the zero-forcing criterion, to eliminate MAI. Moreover, the transmitted power assignment for each user should satisfy the minimum received SINR requirements. The allocated power is derived base on underloaded and overloaded situation.

Keywords : DSTP ; MISO ; MAI ; near-far resistant ; Zero-forcing ; Beamforming

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