

ABSTRACT

Many digital signal processing algorithms have been developed for the application of smart antenna in wireless cellular communications. One of them is by using the eigenvalue approach or the so called downlink eigenbeamforming. In this paper, the algorithm performance will be studied upon as part of the preparation on the future implementation using Texas Instruments TMS320VC33 processor.

The performance study is carried out upon parameters, such as: the impact of channel estimation accuracy upon the beamforming output, the effects of separation angles between two adjacent users on the beam resolution, and also the impact of a multi-user environment upon the SNIR performance of the eigenbeamforming algorithm.

Finally, conclusions are presented on the last chapter of this paper. An SNR performance decrease of up to 60 dB will occur along with the 30 dB increase of gaussian noise to degrade channel estimation accuracy. Degree-of-freedom to beamform maximas using uniform linear array is limited to azimuthal angles of minus 145 to minus 15 degree in a macrocell model. While in the microcell and picocell model, the constraints are less. Finally, a 18 to 25 dB of SNIR performance degradation occurs in all cell model because of up to 7 interferers that appear. A recommendation is also given for the next research to establish a more realistic performance study using real life propagation channels and implementation of software-defined radio (SDR).