MOBILE SPEED ESTIMATION FOR HIERARCHICAL WIRELESS NETWORK

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ABSTRACT

The implementation of hierarchical cellular system, which can effectively reduce the number of handoffs thus significantly improve the overall system capacity, requires the knowledge of mobile user speed at the base station. This thesis focuses on the development of a mobile speed estimation algorithm for practical wireless information system. The statistical properties of different wireless propagation environments are analyzed based on their respective mathematical reference models. The analytical results are applied to facilitate the algorithm design. The mobile speed estimation algorithm is developed by utilizing the autocovariance function of the received signal power, and a low pass finite impulse response (FIR) filter is introduced to suppress the high frequency noise and interference components. Specifically, the algorithm is tailored for EDGE system, and slot autocovariance function is introduced to avoid the slot burst frequency of EDGE system, which might affect the estimation accuracy. Both computer simulation and theoretical analysis show that the proposed mobile speed estimation algorithm is reliable, efficient, and it can be employed in a wide range of wireless communication system with diverse wireless environments.