Time-Varying Channel Tracking for Amplify-and-Forward Relay Network in High Doppler Spread

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ABSTRACT

Next generation wireless communication technologies such as wireless metropolitan area network, long-term evolution (LTE), and LTE advanced are designed to deploy cooperative relaying incorporated with orthogonal frequency division multiplexing system. In addition to the higher data rate, these technologies allow users to have a faster mobility than the previous standards. However, due to the fast movement, Doppler frequency causes the carrier frequency offset resulting in intercarrier interference. Modeling and estimating this type of channel play a vital role to fulfill the data rate requirement of the network. In this paper, we develop a high mobility channel estimation method for amplify-and-forward relay-based network. Specifically, we use basis expansion modeling (BEM) to capture the time variation of the channel. Using pilot symbols, the BEM coefficients are estimated by least square and linear minimum mean square error estimators to reconstruct the channel in both time and frequency domains. In addition to the estimators, Cramer–Rao lower bound has been derived as a benchmark of the estimation performance of the channel estimators. It has been shown that the time-domain channel estimation method is simpler and can approximate the channel more efficiently than frequency-domain estimation in very high Doppler spread scenario.

KEYWORDS
Channel tracking; Amply-and-forward relay; OFDM; High mobility channel

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