Statistical Characterization of Dynamic Multi-Path Components for Vehicle-to-Vehicle Radio Channels

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Abstract:

To statistically model time-variant vehicle-to-vehicle (V2V) channels, the dynamic multi-path components (MPCs) are characterized based on suburban measurements conducted at 5.3 GHz. The correlation matrix distance (CMD) is used to determine the size of local wide-sense stationary (WSS) region. Within each WSS time window, MPCs are extracted using wideband spatial spectrum of Bartlett beamformer. A MPC distance (MCD)-based tracking algorithm is used to identify the “birth” and “death” of MPCs over different WSS regions, and the lifetime of MPC is modeled with a truncated Gaussian distribution. Distributions of number of MPCs and their positions are statistically modeled. The MPC characterization considers both angular and delay domain properties as well as the dynamic evolution of MPCs over different WSS regions. The results shows insight into the dynamic behaviors of MPCs in V2V environments, and is useful for the scatterer modeling in the geometry-based stochastic channel modeling.