Shadow Fading Model for Vehicle-to-Vehicle Network Simulations

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Abstract:

The Vehicle-to-Vehicle (V2V) propagation channel has significant implications on the design and performance of novel communication protocols for Vehicular Ad Hoc Networks (VANET). Extensive research efforts have been made to develop V2V channel models to be implemented in advanced VANET system simulators for performance evaluation. The impact of shadowing caused by other vehicles has, however, largely been neglected in most of the models, as well as in the system simulations. In this paper we present a simple shadow fading model targeting system simulations based on real world measurements performed in urban and highway scenarios. With the help of video information the measurement data is separated for the situations like line-of-sight (LOS), the obstructed line-of-sight (OLOS) by vehicles, and non line-of-sight (NLOS) by buildings. It is observed that the vehicles obstructing LOS induce an additional attenuation of about 10\,dB in the received signal power. We use a Markov chain based state transition diagram to model transitions from LOS to obstructed LOS and present an example of state transition intensities for a real traffic mobility model. We also provide a simple recipe, how to incorporate our shadow fading model in VANET network simulators.