Impact of Spatial Correlation in Interference on Broadcast Packets in Vehicular Ad Hoc Networks

Jaedeok Kim and Ganguk Hwang

1) Department of Mathematical Sciences, KAIST, Daejeon 305-701, KOREA

Corresponding Author: Ganguk Hwang, guhwang@kaist.edu

ABSTRACT
We investigate the impact of spatial correlation in interference on the performance of a broadcast packet in a VANET with the slotted ALOHA protocol. We consider the packet delivery probability (PDP) as the performance metric of a broadcast packet. The PDP is important for safety-related or control-related applications, in which a broadcast packet is requested to be delivered to all neighbor vehicles. The performance of a broadcast packet is significantly affected by channel fading and interferences to vehicles. Considering the path loss in the signal power, interference from a transmitter to a receiver is determined by the distance between them and the locations of the other transmitters. So there exist correlations among interferences at receivers and accordingly successful receptions of a broadcast packet are spatially correlated. Since the exact analysis of the correlation in interferences is not mathematically tractable, the spatial correlation in interferences is not considered in the performance analysis [1,2]. In this work, we derive the PDP with a consideration of the spatial correlation in interference and then investigate the impact of spatial correlation on the PDP. Through numerical and simulation results, we show that the PDP is significantly affected by the spatial correlation.

REFERENCES
