

A PRIORITY-BASED CROSS-LAYER DESIGN FOR FUTURE VANETS THROUGH FULL-DUPLEX TECHNOLOGY

ABSTRACT

Among all requirements for vehicle-to-everything (V2X) communications, successful delivery of packets with small delay is of the highest significance. Especially, the delivery of a message before a potential accident (i.e. emergency message) should be guaranteed. In this project propose a novel cross layer design to enhance the delivery of emergency messages so that accidents can be further avoided. Particularly, in the PHY layer, imperfect full duplex (FD) simultaneous transmitting and sensing is analysed and dynamic thresholds for determining the channel status before and during transmissions are mathematically formulated. Then a novel FD MAC protocol, named priority based multiple access (PBMA), based on prioritized messaging between different vehicles is proposed. Average collision probability, collision duration, waiting time as well as successful delivery rate of the system are formulated too. The delivery performance of emergency messages is also mathematically derived. In addition, comparisons have been made among three different mechanisms. Benchmark is the DSRC standard which uses half duplex (HD) technology with enhanced distributed channel access (EDCA) protocol. We also compare our proposed protocol with FD EDCA. Simulations have verified the accuracy of our analysis. They have also illustrated the delivery of emergency messages has been enhanced by deploying our proposed design.