Coordination of Connected Vehicle and Transit Signal Priority on Transit Evacuations

Primary Author: Li Zhang, Mississippi State University
Secondary Author(s): Yi Wen, Zhitong Huang, Mississippi State University

Abstract During an emergency evacuation, execution time is always critical to the evacuees who are transit dependent. Transit Signal Priority (TSP) could speed up the transit services by prioritizing the approaching bus at a signalized intersection. With the emergence of Connected Vehicle, which is a wireless communication technology used to transfer data among vehicles and infrastructures, a TSP system can obtain more accurate traffic data and react to the approaching bus in a wider area. This paper proposes an adaptive TSP system to facilitate the transit-based evacuation based on the U.S. DOT’s Connected Vehicle. A TSP optimization model, which includes bus travel time prediction and traffic signal optimization, has been developed. The TSP optimization model considers both the bus delay and the network-wide vehicle delay. It determines when and which TSP strategy will be applied. A case study based on the Hurricane Gustav evacuation is investigated. CORSIM serves as a developmental environment and test bed for evaluating the TSP system. CORSIM Run Time Extension is developed to embed the optimization model and algorithm and simulate the Connected Vehicle functions. The results show significant improvement on the transit vehicles delay and insignificant increase on the total vehicle delay by implementing the TSP optimization model. Key Words: Transit Signal Priority, Emergency Evacuation, Connected Vehicle, CORSIM RTE, Signal Optimization.