An Authority-based Idle Bandwidth Sharing Approach in Vehicle Ad-hoc Network

Jin-Lih SHIEH1,2, Wei-Hsun LEE3, Yau-Hwang KUO4

1Student, Department of Computer Science and Information Engineering, National Cheng Kung University, Tainan, Taiwan, ROC; 2Lecturer, Management Information System Department, Far East University, Tainan, Taiwan, ROC; email: shiehjl@cc.feu.edu.tw 3Assistant Professor, Department of Transportation and Comm. Management Science, National Cheng Kung University, Tainan, Taiwan, ROC; email: leews@mail.ncku.edu.tw 4Professor, Department of Computer Science and Information Engineering, National Cheng Kung University, Tainan, Taiwan, ROC; email: kuoyh@ismp.csie.ncku.edu.tw

ABSTRACT

The fast development of wireless communication technologies such as VANET and telematics services is getting popular. Some of them, such as the traffic management system, audio/video streaming services and location-based services, need large Internet bandwidth which may exceed the available bandwidth of a vehicle. In this paper, an Authority-based Idle Bandwidth Sharing Approach (AIBSA) is proposed to provide extra bandwidth for vehicles required to access telematics services. To achieve this goal, AIBSA creates an overlay of idle bandwidth information for vehicles, including their authority relationships and quantities of idle bandwidth. Using that information, AIBSA helps vehicles obtain extra Internet access bandwidth from other vehicles through inter-vehicle communication (IVC) via a short range wireless interface which differs from the main Internet access interface. The maximum flow planning principle is adopted to develop a novel idle bandwidth planning algorithm which can find out one or more authorized bandwidth utilization paths for the demanding vehicles to get expected Internet bandwidth from the idle bandwidth owners. The proposed planning algorithm also considers the overall status of idle bandwidth demands and supplies, global idle bandwidth utilization efficiency, and authorization policies. Using AIBSA, the authority, bandwidth competition and low idle bandwidth utilization problems in traditional bandwidth sharing schemes can be solved. A simulation program is developed to evaluate the performance of AIBSA, and the simulation result shows that it can largely enhance the global utilization of idle bandwidth in a VANET.

1. INTRODUCTION

Mobile Internet service is provided by a mobile network operator has become more and more popular as mobile devices become the essential parts of our lives, and