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Enhancement of Link Stability and Connectivity in Vehicular Ad hoc Networks

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Abstract: Vehicular Ad hoc Networks is a promising sub-group of MANET. VANET is deployed on the highways, where the vehicles are mobile nodes. Safety and intelligent transportation are important VANET applications that require appropriate communication among vehicles, in particular routing technology. VANETs generally inherit their common features from MANETs where vehicles operate in a collaborative and dispersed way for promoting contact among vehicles and with network infrastructure like the Road Side Units (RSU) for enhanced traffic experience. In view of the fast growth of Intelligent Transportation Systems (ITS), VANETs has attracted considerable interest in this decade. VANET suffer from a major problem of link failure due to dynamic mobility of vehicles. In this paper we proposed a position based routing algorithm to identify stable path, this will improve the routing by decreasing overhead and interrupting the number of links. Link Expiration Time (LET) is used to provide the stable link, the link with the longest LET is considered as the most stable link. The multicast Ad-hoc On-demand Distance Vector (MAODV) is proposed to avoid the link breakages by using a link with longest LET. Data loss is reduced by avoiding link breakages and enhance throughput by reducing the communication delay.

Keywords: Greedy Forwarding, Link Expiration Time, Mobility Prediction, Routing, VANET

1. Introduction

VANET is getting lots of attention from academia and industry because many new applications and services aimed at improving the quality of road traffic and traveler's lives depend on VANET [1]. High mobility and fast topology change characteristics of VANET makes it susceptible to link breakages and data loss due to unstable link connectivity. The problem of communication link instability due to rapid topology changes reduces the reliability of the vehicular communication. It leads to severe security threats [2]. Geo- positioning is one of the applications of intelligent transportation which uses vehicle mobility for broadcasting locations in a explicit city region [3]. VANETs provide different kinds of services by means of communication between roadside units and vehicles as shown in figure 1[4]. In VANETs, a group of several vehicles is built on the basis of similar features. Most commonly VANET uses a Mobility-based clustering approach [5]. High speed of vehicle nodes in VANET leads to poor performance in case of stability and reliability of the cluster [6]. In VANETs, routing is very difficult to form a network topology because of vehicle speed and sometimes leads to network disconnection.
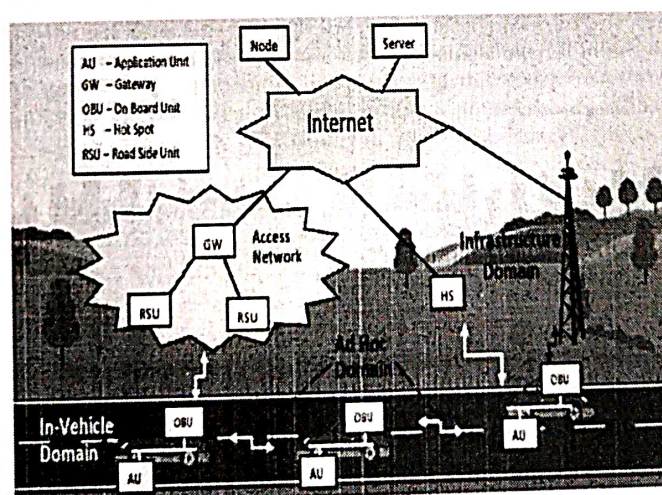

Figure 1. VANET Architecture Diagram

The basic need for the routing protocol is to determine how exactly the router interacts with each other. The information that is being transmitted on the network benefits them by finding routes between two communication link [7]. The routing technique in position based protocol is based upon geographical information of vehicles in motion. Source node uses geographical location of destination node to send a message instead of network