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Video Service using Smart AP and GPS in Vehicle Network

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Abstract. This paper deals with the seamless video service using smart APs and GPS in vehicle network. The smart access points (SAP) in vehicle network have cache and a table for servicing video items. The SAP is controlled by a switching/handover agent (SHA) with buffer, and it manages some servicing vehicles and serviced video items. And the vehicles request video service to video server through SHA with a new header added to IP address that composed of network ID, vehicle ID and GPS information (driving distance or driving speed). This paper solves that the problems of video server's excessive load and the deficiency of vehicle communication network (VCN) resources, and it provides a seamless multimedia service because this proposed mechanism fulfills a smooth handover using SHA and SAP in the VCN network.

Keywords: V2V network, Multimedia, Handover, Switching agent, GPS.

1 Introduction

Until now, the study on the providing multimedia service may divide into two main parts, perhaps one field is how to use effectively insufficient network resources and the other one is how to reduce the load of media server. But in the wireless network, one main problem that could be cutoff the connection during the movement of mobile users is added. Especially, that is critical problem in vehicle communication network [1, 2, 3].

Recently, some of the most important service in vehicle-to-infrastructure/vehicle-to-vehicle communication network maybe seamless multimedia services for entertainments and traffic alerts for safety [4, 5]. Thus, this paper presents seamless multimedia service mechanism vehicle-to-infrastructure network. This mechanism can be used for traffic alerts for safety in the case of adopting ad-hoc mode, and let that reserve for future work.

Multimedia services in vehicle-to-infrastructure network and wireless network have some critical drawbacks that are facing with the cut off connection to multimedia server and the loss of transmission packets [2, 6].

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This paper deals with the seamless video service using switching/handover agent (SHA) with buffer, smart APs(smart RSU: road side unit) and GPS speed information in vehicle communication network(VCN). The SHA with buffer and SAP can solve that the disconnection to multimedia server maybe occurred along the course of changing IP address when the vehicles serviced are driving the boundary of SAPs [7]. And this paper adopts the GPS speed information to reduce the possibility of transmission packet loss or error. Thus, the proposed mechanism solves problems that disconnection to server and transmission packet loss with the aid of a new IP header including a partial of GPS information without changing original IP address assigned from the first accessed SAP in VCN network.

The rest of this paper is as follows: Section 2 presents the structure and operations of video service mechanism using smart AP and GPS speed information in vehicle network. Finally, we discuss our conclusion.

2 The Mechanism for a Seamless Video Service System in Vehicle Communication Network

The structure of the proposed a seamless multimedia service system in VCN network as shown in Fig 1, and that is just like mentioned in paper 7. The proposed seamless multimedia service system in VCN network consists of a multimedia server, some switching/handover agents (SHA), some smart access points (SAP or smart RSU: road side unit) with cache and a number of vehicles. The VCN network is divided into some local-vehicle-network (LVN) that is composed of a SHA and some SAPs or S-RSUs (smart-RSU).

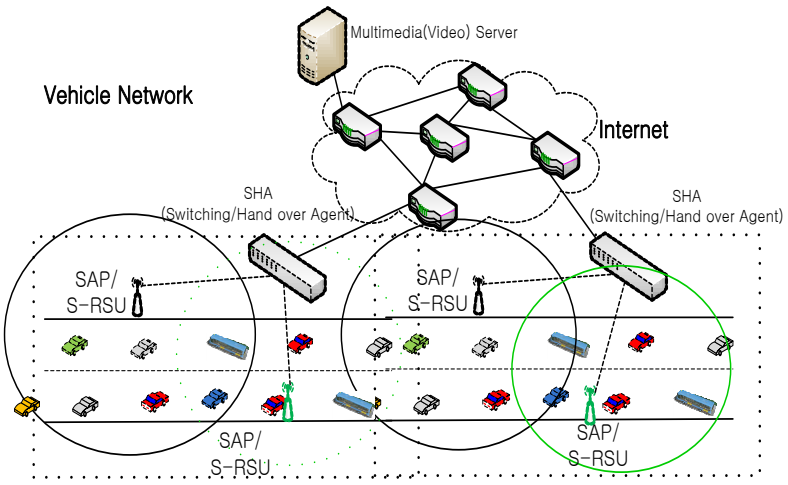

Fig. 1. The structure of the proposed seamless multimedia service system in VCN network

The SAP assigns a virtual IP address when vehicles enter into the VCN network. A virtual IP address is composed of 5-fields that are two LVN IDs, one SAP ID, a

vehicle ID and a vehicle speed field(or driving distance within vehicle network). Fig. 2 shows the format of a virtual IP address. The length of virtual IP address is composed of 32-bits long including 6-bit reserved field.

As shown in Fig. 2, two LVN IDs indicate a moved LVN ID and the 1st LVN ID. The 1st LVN ID is assigned from a SAP accessed when a specific vehicle(*vehicle_i*) is entering the VCN network for the first time and the moved LVN ID is assigned from a SAP accessed when *the vehicle_i* entered the other LVN from the 1st LVN. The vehicle ID field is the proper number of vehicles and the vehicle speed field indicates driving distance within vehicle network as GPS information to use that providing a partial of smooth handover and reducing the possibility of packet loss during handover.

The SHA performs switching video streams transmitted from the server to vehicle requested service through SAPs in a specific LVN [7]. Performing switching and smooth handover the SHA has mapping table that indicates the relation of SAP and vehicles accessed because change frequently the relation of them during driving.

The SAP manages vehicles accessed within the its communication coverage area in the LVN, assigns virtual IP address to vehicles accessed and sends this relationship information to the SHA[7].

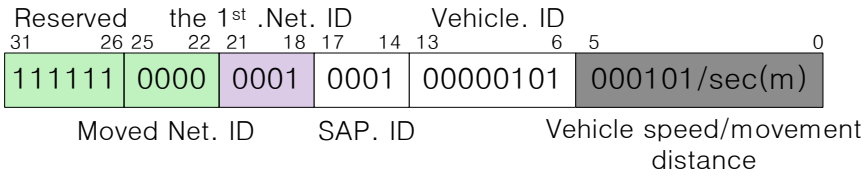

Fig. 2. The format of virtual IP address

3 Conclusion

This paper proposes a seamless multimedia service system using smart access pointer (SAP) and GPS information in vehicle communication network. The proposed mechanism can reduce packet loss and provide smooth handover because it uses the movement distance of vehicle as GPS information. And this mechanism needs SHA with buffer and some SAPs in each local-vehicle network(LVN), and it uses a new virtual IP address that is composed of five fields(32-bits long). Thus, this proposed mechanism may improve handover and reduce the possibility of packet loss in process of handover.

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