International Journal of Innovative Research in Science and Engineering
Vol. No.2, Issue 03, March 2016
www.ijirse.com
ISSN: 2454-9665

COOPERATIVE VIDEO STREAMING PROTOCOL OVER THE HYBRID VEHICULARNETWORKS-A REVIEW

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ABSTRACT

New types of networking services arise for automotive users with the development of vehicular networks. With regard to multimedia streaming services, a vehicle may not have good quality of service (QoS) of video streaming using its own individual 3G/3.5G wireless interface. When a vehicle requests a video stream encoded in H.264/Scalable Video Coding from the Internet using its 3G/3.5G network, it asks help from vehicles belonging to the same fleet within its k-hop transmission range to download the requested video data cooperatively through these vehicles' 3G/3.5G network and then forward these downloaded video to the requested vehicle through vehicle-to-vehicle IEEE 802.11p networks. A k-hop adaptive video transmission protocol is proposed to have better throughput by the following: 1) selecting suitable vehicles within k-hop coverage to download video data and 2) retransmitting the lost video data from the video server to improve the quality of video. We utilize EstiNet Network Simulator and Emulator (NCTUns) to simulate the proposed schemes. Based on the simulation results, the priority-first (PF) assignment scheme with the PF retransmission scheme is suitable to be adopted in the cooperative video streaming scenario over the vehicular networks.

Keywords: Cooperative streaming,vehicular ad-hoc network (VANET), dedicated short-range communication (DSRC) ,H.264, mobile converged network, Scalable Video Coding (SVC)

I. INTRODUCTION

When a number of persons, e.g., a family or a group of friends, drive their vehicles for a trip together, they can form a fleet of vehicles and share their network resources during their trip. Let one member want to watch a video from the Internet. He may not have high resolution or video quality due to his limited 3G/3.5G bandwidth to the Internet. The cooperative video streaming scenario allows the requested member to ask other members of the same fleet to download video cooperatively. In other words, othermembers can help to download parts of the video from the Internet and then forward video data to the requested member hop by hop through the ad-hoc network. This work proposes the k-hop cooperative video streaming protocol using H.264/SVC over the hybrid vehicular networks which consist of 3G/3.5G cellular network and Dedicated Short-Range Communications (DSRC) ad-hoc network. In order to smooth video playback over the DSRC-based ad-hoc network, this work proposes: (1) one streaming task assignment scheme that schedules the streaming task to each member over the dynamic vehicular networks, and (2) packet forwarding strategies that decide the forwarding sequence of the buffered video data to the requested member hop by hop. Finally, the network simulator version 2 (NS2) to simulate the proposed protocol. Based on the simulation results, the proposed scheme can estimate the assignment interval adaptively and the playback priority first (PPF) strategy has the best performance for the k-hop video forwarding over the hybrid vehicular networks.

II. LITERATURE SURVEY

Chung-Ming Huang [1] has studied An Adaptive Video Streaming System over a Cooperative Fleet of Vehicles Using the Mobile Bandwidth Aggregation Approach. In this paper they have investigated the k-hop cooperative streaming scenario in fleet-based vehicular networks. When a vehicle requests a video stream encoded in H.264/Scalable Video Coding from the Internet using its 3G/3.5G network, it asks help from vehicles belonging to the same fleet within its k-hop transmission range to download the requested video data cooperatively through these vehicles' 3G/3.5G network and then forward these downloaded video to the requested vehicle through vehicle-to-vehicle IEEE 802.11p networks. A k-hop adaptive video transmission protocol is proposed to have better throughput by the following: 1) selecting suitable vehicles within k-hop coverage to download video data and 2) retransmitting the lost video data from the video server to improve the quality of video. They have utilized EstiNet Network Simulator and Emulator (NCTUns) to simulate the proposed schemes. Based on the simulation results, the priority-first (PF) assignment scheme with the PF retransmission scheme is suitable to be adopted in the cooperative video streaming scenario over the vehicular networks.

Chao-Hsien Lee [2] has studied The K-hop Cooperative Video Streaming Protocol Using H.264/SVC Over the Hybrid Vehicular Networks. In this paper they have proposes the k-hop cooperative video streaming protocol using H.264/SVC over the hybrid vehicular networks which consist of 3G/3.5G cellular network and Dedicated Short-Range Communications (DSRC) ad-hoc network. In order to smooth video playback over the DSRC-based ad-hoc network, this work proposes: (1) one streaming task assignment scheme that schedules the streaming task to each member over the dynamic vehicular networks, and (2) packet forwarding strategies that decide the forwarding sequence of the buffered video data to the requested member hop by hop. Finally, they have utilized the network simulator version 2 (NS2) to simulate the proposed protocol. Based on the simulation results, the proposed scheme can estimate the assignment interval adaptively and the playback priority first (PPF) strategy has the best performance for the k-hop video forwarding over the hybrid vehicular networks.

Shunanlin [3] has studied video transport over ad-hoc networks using multiple paths in this paper, they review several video encoding and transport control techniques, all assuming that a routing protocol is able to set up and constantly update two paths each made of multiple links. The techniques that they have examined include i) layered coding and selective automatic repeat request (arq), ii) reference picture selection, and iii) multiple description coding. Depending on the availability of a feedback channel, the delay constraint, and the error characteristics of the established paths, one technique is better suited than another. These techniques are also applicable to other networks such as the internet where it is possible to set up multiple paths.

Shiwen Mao[4]has presented Video Transport Over Ad Hoc Networks: Multistream Coding With Multipath Transport. In this paper, he propose to combine multistream coding with multipath transport, to show that, in addition to traditional error control techniques, path diversity provides an effective means to combat transmission error in ad hoc networks. The schemes that he have examined are: 1) feedback based reference picture selection; 2) layered coding with selective automatic repeat request; and 3) multiple description motion compensation coding. All these techniques are based on the motion compensated prediction technique found in modern video coding standards. We studied the performance of these three schemes via extensive simulations using both Markov channel models and OPNET Modeler. To further validate the viability and performance advantages of these schemes, he implemented an ad hoc multiple path video streaming test bed using notebook computers and IEEE 802.11b cards. The results show that great improvement in video quality can be achieved over the standard schemes with limited additional cost. Each of these three video coding/transport techniques is best suited for a particular environment, depending on the availability of a feedback channel, the end-to-end delay constraint, and the error characteristics of the paths.

Wei Lou [5] has studied a K-hop Zone-Based Broadcast Protocol in Mobile Ad Hoc Networks .In this paper, they discuss the broadcast problem in MANETs with the consideration of generic K-hop neighbor set. The proposed K-hop zone-based broadcast protocol is a simple, scalable protocol. They have provided a generic framework for a broadcast operation with K-hop information and they have determined the potential performance improvement by increasing the value K.1 .They have considered a mobile ad hoc network (MANET) as a unit disk graph G =(V,E), where the node set V represents a set of wireless mobile hosts (nodes) and the edge set E represents a set of bi-directional links between the neighbors. Each node has a unique identification (ID). Two nodes are considered neighbors if and only if their geographic distance is less than the transmission range. Broadcasting, as a fundamental operation, can be viewed as finding a connected dominating set (CDS) in a unit disk graph. A dominating set (DS) is a subset of nodes such that every node in the graph is either in the set or is adjacent to a node in the set. If the sub graph induced from a DS of the network is connected, the DS is a CDS. Finding a minimum connected dominating set (MCDS) in a given graph is NP-complete; in a unit disk graph, it has also been proved to be NP-complete. Therefore, only heuristic algorithms can be applied.

III.CONCLUSIONS

Fleet-based cooperative streaming, which is a new and specific infotainment service over the hybrid vehicular networks, has been researched. The fleet-based cooperative streaming over vehicle network has been proposed and described. Based on a fleet, one requester can cooperate with helpers in the *k*-hop transmission range to download the requested video data. The proposed system divides the video data into one BL and eight ELs using the H.264/SVC codec. BL is transmitted through the 3G/3.5G link of the requester; ELs are scheduled to be transmitted through helpers' 3G/3.5G links and then forwarded to the requester using helpers' 802.11p links. Once helpers can be determined using the *k*-hop 3G/3.5G bandwidth aggregation cheme, the requester assigns part of the video data to each helper using the PF or the DF assignment algorithm. urthermore, in order to handle the lost packets during the transmission, a BARTS is designed to retransmit the lost packets. According to our simulation results, the PF assignment scheme with the PFRS retransmission scheme has the best PSNR values and the smoothest video playback than others. The possible future work would focus on the following: 1) the delay-tolerant networking issue to relay video data back to the requester and 2) having multiple 802.11p interfaces to forward video data back to the requester.

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