Challenges of SDN-based VANET

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1. Introduction

In modern society, increasing traffic congestion and traffic accidents are major problem. The main cause of the problem is that the sensing of surrounding information and the decision of car behavior depend primarily on the driver's physiological cognition. However, the driver's perceptual ability is usually very limited. Therefore, vehicles must have the ability to communicate with each other in real time to form a network and build an Intelligent Transportation System(ITS) to alleviate traffic congestion and improve traffic safety. With the rapid development of communication technology, Vehicular Ad Hoc Network(VANET)[1] technology has become a solution that can support vehicle communication and provide a wide range of services.

The proliferation of smart cars causes fundamental network problems in VANET. The high mobility of the vehicle results in frequent handovers between different wireless access and channels. Future VANET faces challenges such as low latency and real-time application, high bandwidth, and connectivity. To solve these problems, Software-Defined Networking(SDN), an efficient communication method that supports vehicle mobility, was applied to VANET.

In this paper, considerations when constructing an SDN-based VANET is summarized and future research directions are discussed.

2. Considerations for Implementing SDN-based VANET

SDN[2] is a new type of next-generation network architecture that aims to extract control processes (control plane) and packet forwarding (data plane) from the network. SDN is a powerful innovation that can facilitate the dynamic properties of VANETs by encouraging large-scale optimization through the flexibility and integration abstraction of network management[3].

SDN introduces new features to the VANET arena, but is vulnerable to new threats. To design SDN-based VANET, the following issues should be considered.

· VANETs consist of devices such as Roadside Units, Base Stations, Internet of Things enabled devices, etc. It is difficult to keep synchronization with different communication standards between each device. Synchronization latency must also be taken into account.

· Some VANET architectures are centralized and overload the controller, sometimes not achieving proper results. A distributed architecture can be used to solve the problem.

· The integration of SDN and VANET includes technologies such as 5G, floating content, and cloud computing that provide features such as low latency and superior packet delivery ratio. High performance, but at increased cost.

· SDN provides security but is vulnerable to new attacks. Therefore, the security of the VANET should be considered.

3. Conclusion and future works

This paper summarizes the considerations when applying the SDN-based vehicle network for the implementation of the integrated vehicle system.

Based on this paper, we plan to conduct research on the handover method applying clustering in the SDN-based VANET environment. In addition, we plan to develop an algorithm that can support data communication during handover by caching data in advance by applying mobile edge computing technology.

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