Title: Result of Autonomous Driving Vehicle Control Using US-Japan Reconfigurable Resource Pool Networking Experiment

Authors: Goki Yamamoto† (Speaker), Yoshiki Aoki†, Kodai Yarita†, Satoru Okamoto† and Naoaki Yamanaka†

Affiliation: † Graduate School of Science and Technology, Keio University

Contact Information: goki.yamamoto@yamanaka.ics.keio.ac.jp

Abstracts: The development of a new transportation system has been promoted. Autonomous driving vehicle (ADV) is one of new transportation systems. ADV has a variety of sensors such as millimeter wave radars, LIDAR (Laser Imaging Detection and Ranging) and cameras. However only using these sensors by ADV, there is a problem that ADV can sense only own environment and need to make a decision based on limited information. To deal with this problem, the method of using a cyberspace control while sharing information with the surrounding ADV is examined. Agents on cyberspace control vehicles while gathering information via networks. In order to utilize cyberspace, a network that can satisfy high QoS requirements is necessary. Network-assisted ADV platform that deals with various QoS requirements has been proposed [1, 2]. The platform consists of cloud and edges because mobile edge computing (MEC) provides low latency and locally decisions.

In this presentation, mobile edge computing (MEC) environment for ADV platform over the network connected 5 sites (Keio Univ. (JPN), NICT Koganei (JPN), SC18 Dallas NICT site, SC18 UTD site, and SC18 SCinet NOC) will be demonstrated. We accomplish migrating agents which are implemented by virtual machines (VM) between several edges. Reconfigurable Communication Processors (RCPs) are used for this MEC environment. RCPs configured by many kinds of hardware (LSI, FPGA, NPU, CPU, etc.) provide a reconfigurable resource pool such as 100 Gbps routing/switching systems and computing resources. Cloud servers in Japan and edge servers including RCPs in USA are connected by JGN and other NRENs. Ethernet-over-WDM SDN orchestration of VM live migration is applied to keep RTT between the vehicle and agent program of the vehicle in VM less than 10 ms.

Fig 1. Implementation and experiment configuration in SC18

Reference: