

Report on the 2021 NS English Session Awards and Award Ceremony

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1. Introduction

In the 2021 IEICE General Conference held on 9th – 12th March 2021, the IEICE Technical Committee on Network Systems (NS) provided the complete English Symposium Session entitled “AI technologies and their applications for future network systems and services”. Although the general conference was canceled due to concerns about COVID-19, the English session this year was held online via Zoom [1] on 9th March. In this year, 13 papers were submitted to the English session and all papers were presented at the online conference. The submitted papers include a variety of interesting research topics related to “in-network intelligence”, such as security/privacy, network virtualization technologies, Internet of Things (IoT) networks, wired/wireless networking, and machine learning [2].

The NS committee selected recipients of NS English Session Award among the 13 papers. The recipients won the award at an award ceremony and presented the progress of their awarded papers as an invited lecture at the NS technical meeting in October 2021.

2. Award Ceremony

The award ceremony was held in the online NS technical meeting on 8th October 2021, and many participants attended the ceremony. Three distinguished papers won the NS English Session Award, and all the recipients received an award certificate and a plaque from NS technical committee chair (Fig. 1). (For the past recipients, please see our English home page. URL: <http://www.ieice.org/cs/ns/eng/index.html>)

3. English Session Awards 2021

The abstracts of the three papers that received the 2021 NS English Session Award are as follows.

“Investigating Dynamic Mining Time of Private Ethereum Blockchain on IoT Devices” [3]

Blockchain technology has emerged to be integrated in many applications, such as finance, healthcare, and the Internet of Things (IoT). Ethereum is one of the most popular open-source blockchain platforms for IoT applications. Proof-of-Work (PoW) is a well-known consensus algorithm. Essentially, the PoW algorithm



Fig. 1 English session award recipients (Mr. Chen: Top left [3], Mr. Fahrianto: top right [4], Mr. Taniguchi: Bottom left [5], and secretary (Yoshida): Bottom right.

solves a mathematical puzzle by enumerating answers one by one until finding a proper one, which authorizes new blocks. Generally, the IoT devices are considerably resource-limited to execute the PoW algorithm. In Ethereum, the computational complexity for generating new virtual currency will be automatically adjusted according to the flow of virtual currency. Therefore, it is possible to optimize the computational complexity according to the amount of resources in IoT devices utilizing the mechanism in Ethereum. This paper investigates the PoW algorithm of the private Ethereum blockchain in IoT applications. More specifically, Chen et al. experiment with running PoW on an IoT device, which is usually considered insufficient for PoW in the previous works. The results show that the PoW algorithm is dynamically adapted to the computing capacity of the device (i.e., Raspberry Pi 4). Moreover, using the curve fitting method, Chen et al. reveal the PoW's exponential distribution after the adjustment.

“Translation Gateway Between IP and NDN Using Dual Channel” [4]

Named-Data Networking (NDN) is expected to be a new network architecture which efficiently transmits its content items. However, it is unrealistic to assume that all IP routers will be replaced by NDN routers at the same time, so it is necessary to consider the environment in which both IP routers and NDN routers exist in networks. The dual-channel translation gateway can transform between IP packet and NDN packet without violating the user privacy by tagging and differentiating interest packets and data packets using two channels. The gateway offers a means to transform the IP to the NDN protocol back and forth utilizing two separate channels devoted to the interest and the data packet. As a result, the IP protocol may connect and interact with the NDN protocol. The throughput of the dual-channel gateway is examined in this study. It describes the relationship between the content hit ratio and throughput performance in the gateway. It also displays the mathematical throughput model and shows it to the emulator results. The finding reveals that the analysis model can predict the gateway throughput with accuracy on average about 70% from the emulator. It also describes the strong relationship between time distribution of each processing time and hit ratio in the total throughput.

“Performance Evaluation on MAC Layer Protocol in Crash Warning Application using PC5-based Cellular-V2X mode4” [5]

A mobile ad-hoc network (MANET) realizes multi-hop communication with the cooperation of wireless terminals (nodes) without relying on an existing network infrastructure such as wireless access points. However, the relay nodes have to consume their communication resources, notably battery, even though they do not acquire any benefit. Therefore, the nodes may tend to act egoistically since users are basically willing not to forward packet for saving own communication resources. For stimulating users to be more cooperative in MANET, an incentive mechanism that offers electric power in exchange for relaying packets by using wireless power transmission (WPT) technology has been proposed on the ground of high feasibility of the WPT technology. In this paper, authors evaluated the availability of WPT-motivated MANET depending on the circumstances surrounding the users, based on realistic user cooperation models. As a result of simulation experiments, the WPT-motivated MANET achieved that more nodes keep cooperative than the conventional MANET, even after changes in circumstances over time. In addition, the WPT-motivated MANET can reduce the occurrences of route construction errors since it can keep more nodes cooperative and precisely selects more stable routes than the conventional MANET. Furthermore, the WPT-motivated MANET can establish robust network

by reducing changes in the number of cooperative nodes and the number of route construction errors over time. However, it was also found that users voluntarily tend to be cooperative even though they do not acquire any incentive, only when the expected time until the next opportunity to recharge their battery is enough short. In this paper, on the basis of the evaluation experiments, Taniguchi et al. revealed that the WPT-motivated MANET can maintain a robust network for longer period of time.

4. Future Plans

In the 2022 IEICE General Conference, the English Session entitled “Enabling Technologies for Network Systems and Services during the 5G/Beyond 5G Era” will be held on 15th – 18th March. Many interesting studies on “network” and “service” including “wireless” and “optical” will be presented. We plan to hold the IEICE General Conference and enjoy the NS English session during the four days.

5. Acknowledgement

We would like to give special thanks to Prof. Yoshiaki Tanaka for his great contributions.

6. References

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