

SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COLLEGE OF DESIGN AND ENGINEERING

Website: <https://cde.nus.edu.sg/ece>

Area: Communications & Networks

Host: Dr. Alakesh Kalita

TOPIC	:	Cloud-Native End-to-End Network Slicing Architecture for 5G: Design, Implementation, and Performance Evaluation
SPEAKER	:	Mr. Palleri Chettuparambil Amogh Graduate Student, ECE Dept, NUS
DATE	:	Monday, 24 July 2023
TIME	:	11:00AM to 12:00PM
VENUE	:	Join Zoom Meeting: https://nus-sg.zoom.us/j/86534479363?pwd=Q3RwYXILM1VKdDMydHpBcDc3RzZNdz09 Meeting ID: 865 3447 9363 Passcode: 220450

ABSTRACT

As 5G networks are rapidly deployed worldwide, the industry is already envisioning the future of 6G networks. To meet the demands of diverse and complex use cases that will emerge, the development of end-to-end network slicing becomes crucial. However, numerous challenges must be overcome to efficiently allocate and manage network resources, such as radio frequency spectrum and computing power, among different slices, while ensuring isolation, scalability, and orchestration.

In this seminar presentation, we propose a cloud-native end-to-end network slicing architecture (RAN+Core) for 5G, aligned with ETSI-NFV references and 3GPP standards. This architecture spans from the Radio Access Network (RAN) to the core network, allowing for varying degrees of isolation and effectively slicing both RAN and core components to support diverse use cases and service requirements. To tackle the resource allocation challenge, we model the RAN Slice allocation as a two-dimensional bin packing problem, which is known to be NP-hard. We further divide it into inter-slice scheduling and intra-slice scheduling to achieve efficient resource allocation.

Our implementation builds upon the OpenAirInterface (OAI) and FlexRAN platforms, leveraging the open-source Kubernetes orchestrator, Docker container platform, and Prometheus for network monitoring. We evaluate the performance of our proposed algorithms for resource partitioning and accommodation in end-to-end slices using practical load patterns. The performance assessment includes various case studies, focusing on inter-slice scheduling algorithms and emphasizing packing efficiency. Additionally, we conduct a comprehensive evaluation of our cloud-native end-to-end network slicing framework, examining its ability to address challenges across three distinct network slices, thereby showcasing the flexibility and adaptability of network slices on shared RAN and core networks. Lastly, we compare our developed framework with RAN Runtime to highlight the advantages and capabilities of our solution.

This seminar presentation provides valuable insights into the challenges involved in implementing network slicing in 5G and 6G networks and introduces a cloud-native end-to-end network slicing framework. The performance evaluation and comparisons demonstrate the effectiveness of our solution in addressing these challenges and laying the foundation for future advancements in network slicing technologies.

BIOGRAPHY

Amogh PC is currently pursuing Ph.D. in Department of Electrical and Computer Engineering, National University of Singapore. He received M.Tech. Degree in Computer Science and Engineering from Indian Institute of Technology (IIT), Hyderabad, India in 2018. His research interests include Network Functions Virtualization (NFV), Software-Defined Networking (SDN), Network Slicing and Security in 5G/6G.

<https://cde.nus.edu.sg/ece/highlights/events/>