IETF-119

Mobile Object Network Management (MONM) Project

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IETF

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IETF-119 Mobile Object Network Management (MONM) Project

Champion: Jaehoon (Paul) Jeong (SKKU)

IETF-119 MONM Project

Professors:

- Jaehoon (Paul) Jeong (SKKU)
- Yiwen (Chris) Shen (SKKU)
- Younghan Kim (SSU)
- Yun Won Chung (SSU)

Researchers:

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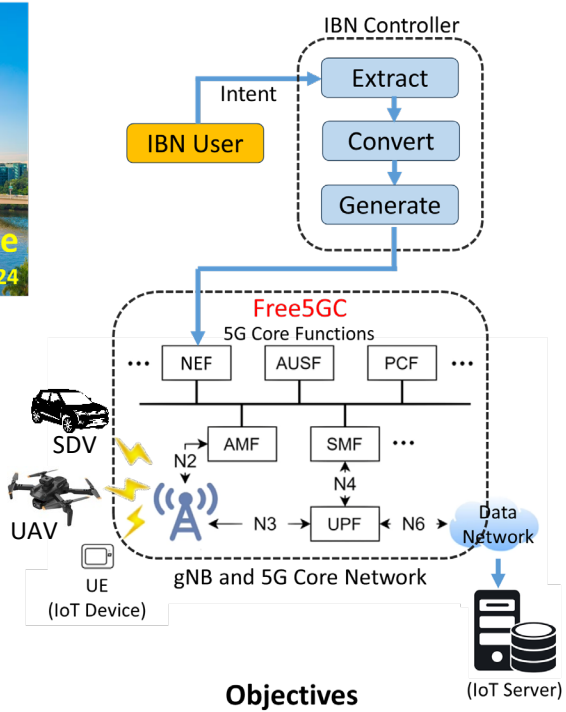
Students:

- Yoseop Ahn (SKKU)
- Mose Gu (SKKU)

Free5GC Architecture



Objectives

- To demonstrate the communication of an IoT Device (UE) with an IoT Server via gNB in free5GC.
- 5G Core Network changes its internal policy according to an IBN User's Intent.

What to pull down to set up an environment:

- OS: Ubuntu 20.04
- Free5GC VM: version 3.4.1
- UERANSIM VM (UE & RAN): version 3.2.6
- GitHub Repository: https://github.com/jaehoonpauljeong/IBN-Network-Management
- Demo Video Clip: https://www.youtube.com/playlist?list=PLSd4MXSO7VifHLtETuyffZtsEAb6ed_Lq

Demonstration for free5GC Communication

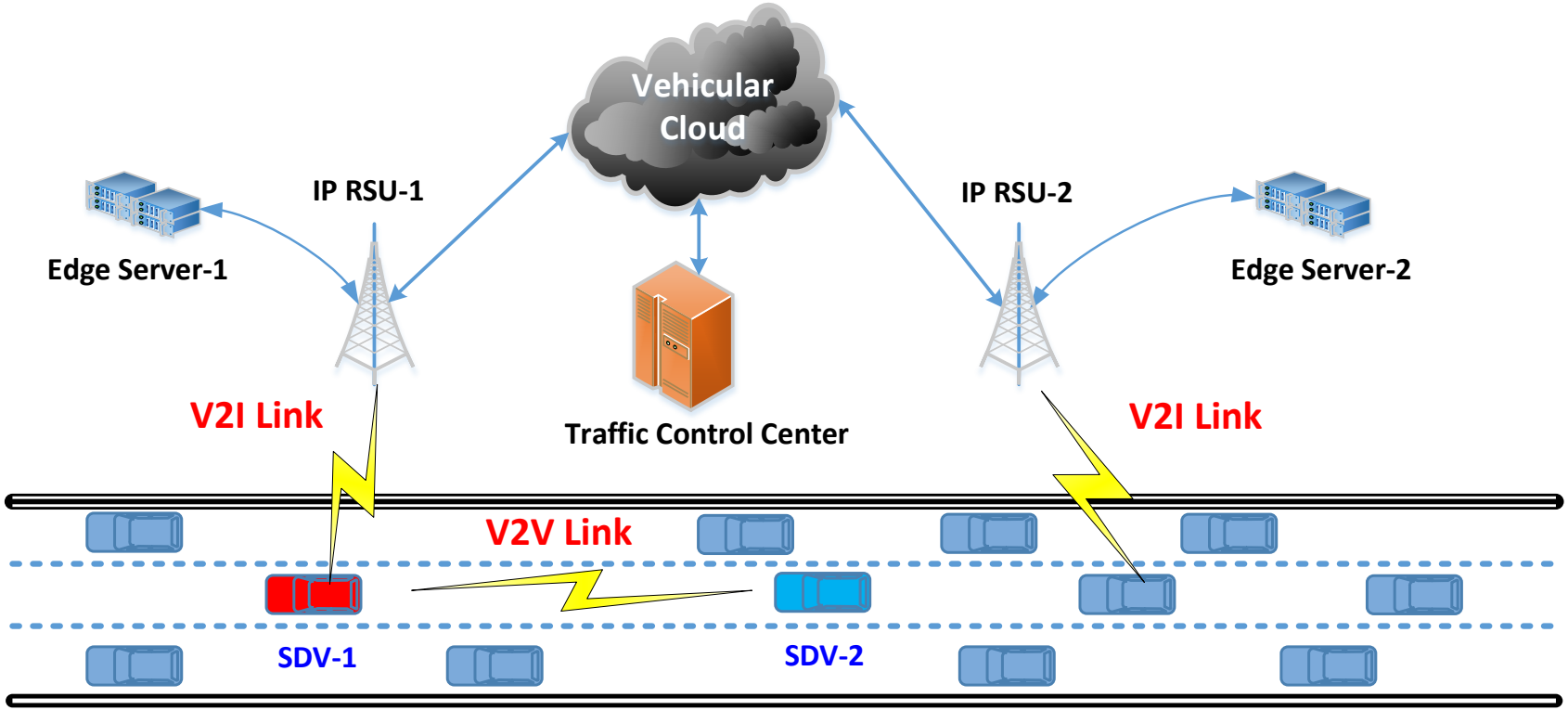
1. Clone Ubuntu server as Free5GC VM and UERANSIM VM.
2. Modify hostname and IP Address on Free5GC VM.
3. Install Golang, MongoDB, All 5G network funtions (e.g., AMF, UPF, etc.), WebConsole on Free5GC VM and test the funtions.
4. Install UERANSIM on UERANSIM VM.
5. Add UE's data on WebConsole of Free5GC
6. Set yaml file parameters of Free5GC and UERANSIM. (UERANSIM: free5gc-gnb.yaml & free5gc-ue.yaml)
7. Run gNB and UE on UERANSIM VM based on yaml files.
8. Let an IoT Device (UE) ping an IoT Server to get a reply from the server.

Future Work:

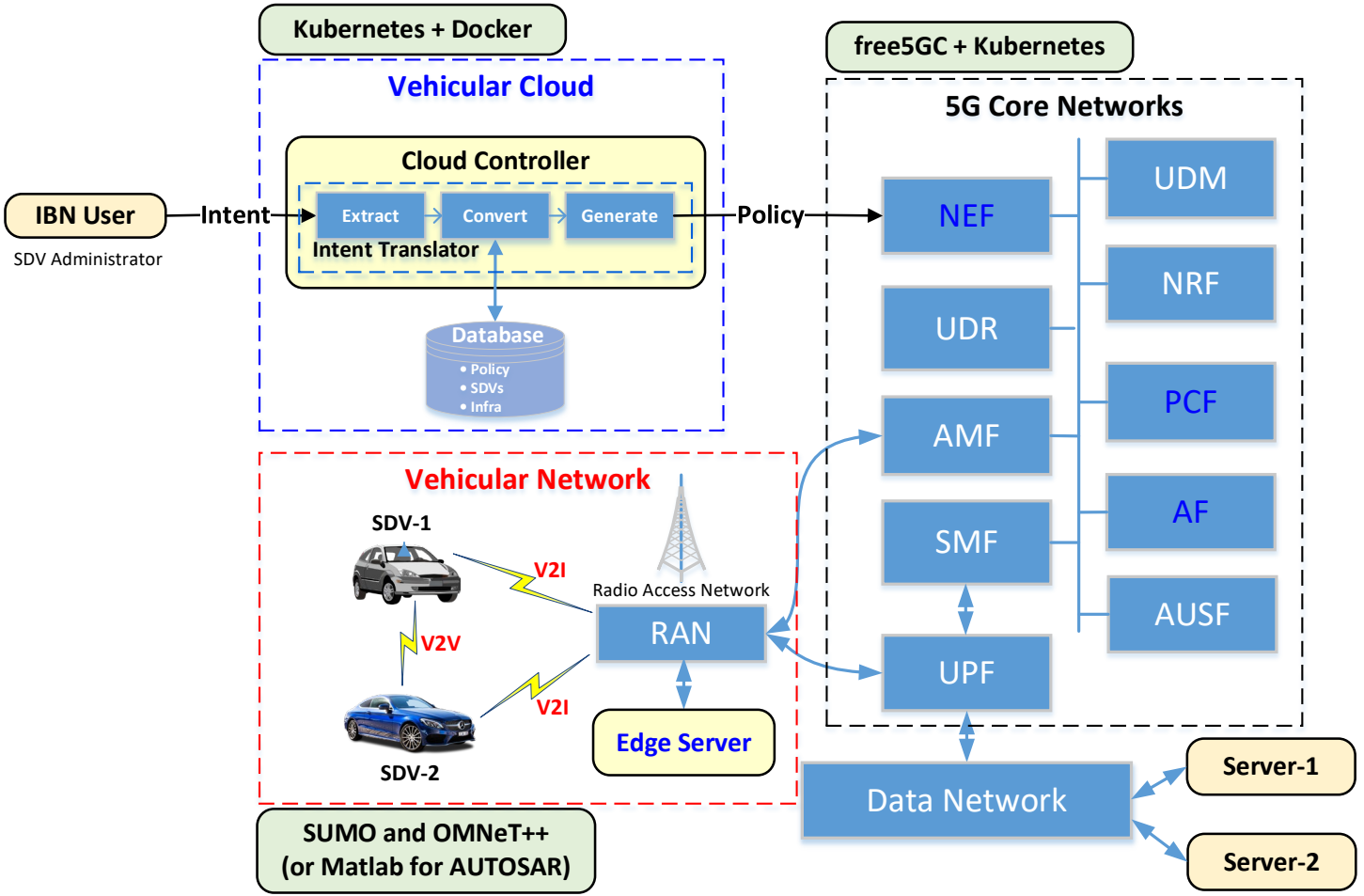
- Development and advancement of the V2X Scenario through 5G network.
- Interaction between Free5GC as 5G Cloud/Edge and AUTOSAR in Matlab Simulink as SDV with Cloud-Native.

What problem you tried to solve?

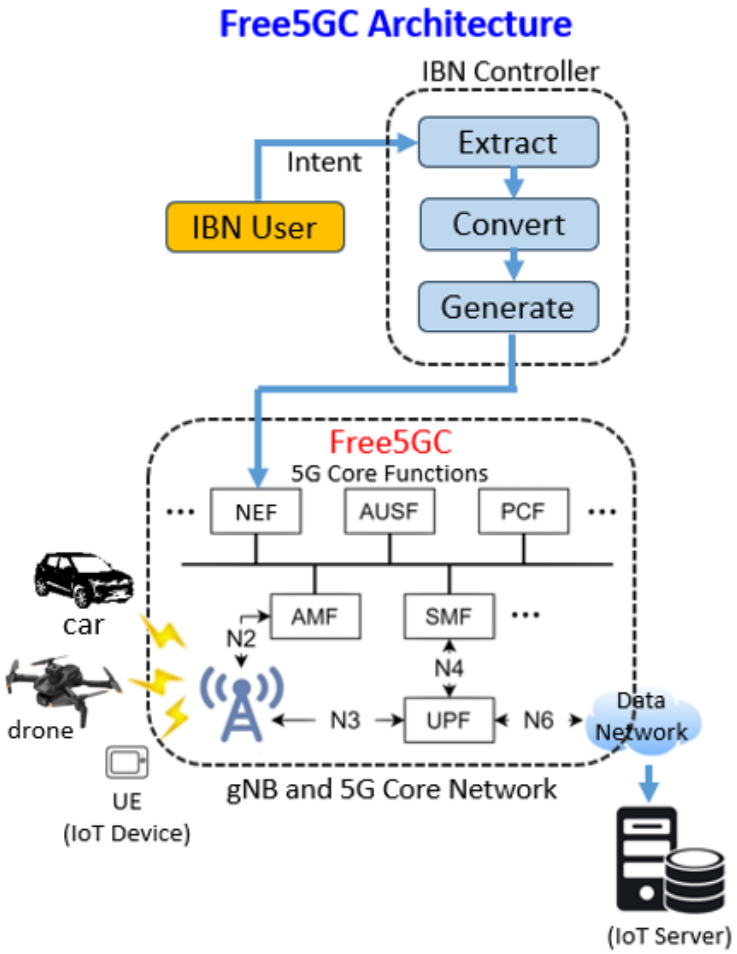
Vehicular Networks for Mobile Objects (MNs) such as Software-Defined Vehicles (SDVs)



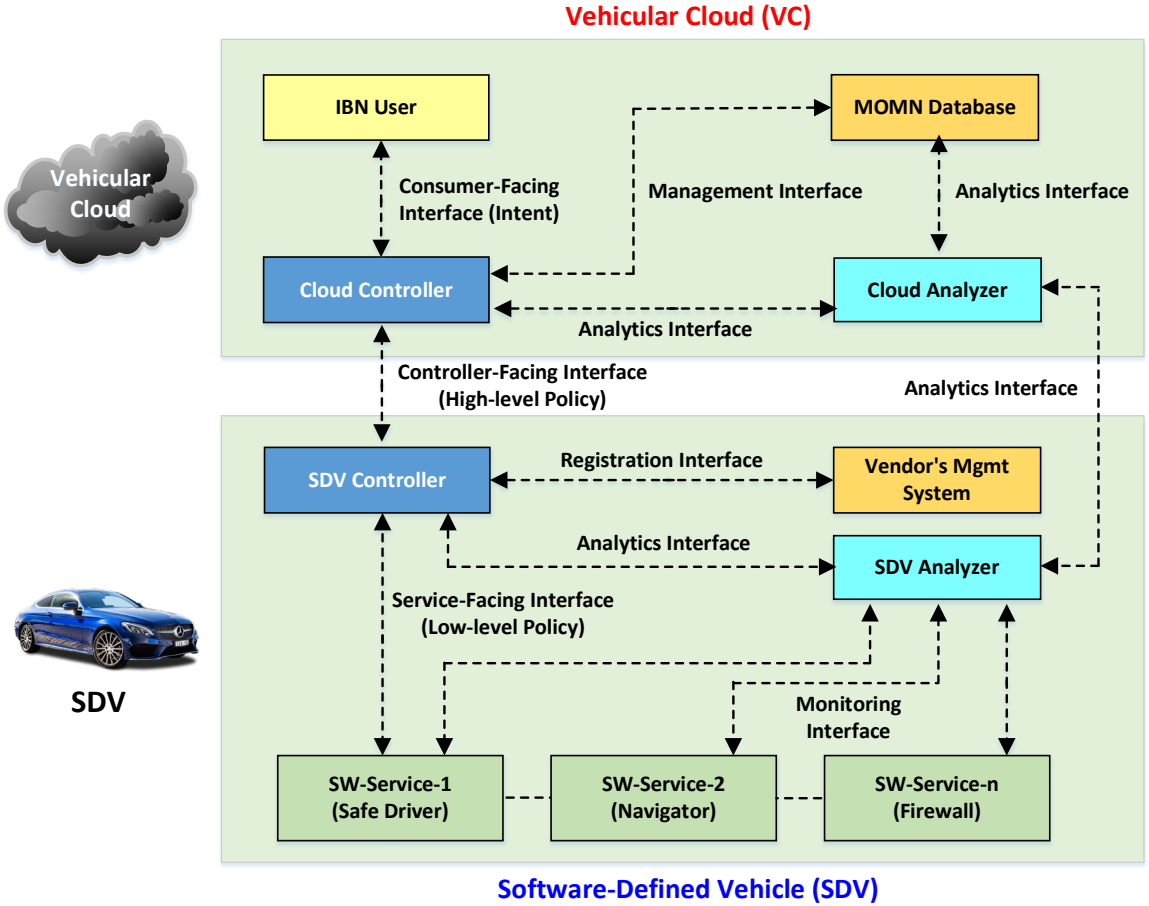
IBN-based MONM for SDV (Software-Defined Vehicle)



Free5GC Architecture



A Framework for IBN-Based MONM for SDV



Hackathon Plan (1/2)

- **Mobile Object Network Management (MONM)**
  - To demonstrate the **communications** and **management** of Mobile Objects (MOs) with an Internet Server via gNB in free5GC.
  - MOs can set up the **configuration and policies** of **network services, security services, and application services** according to an **Intent of Intent-Based Networking (IBN) User**.
    - Install Free5GC, MongDB, Golang and all 5G network functions.
    - Change the yaml configuration file and add a UE's information to IoT Server via Free5GC.
    - Make communication between UE and IoT Server via Free5GC.

Hackathon Plan (2/2)

- **Internet Drafts for Mobile Object Network Management (MONM)**
  - **An Intent-Based Management Framework for Software-Defined Vehicles in Intelligent Transportation Systems**
    - https://datatracker.ietf.org/doc/html/draft-jeong-opsawg-intent-based-sdv-framework-00
  - **Intent-Based Network Management Automation in 5G Networks**
    - https://datatracker.ietf.org/doc/html/draft-jeong-nmrg-ibn-network-management-automation-03
  - **Intent Translation Engine for Intent-Based Networking**
    - https://datatracker.ietf.org/doc/html/draft-pedro-ite-01

What we achieved

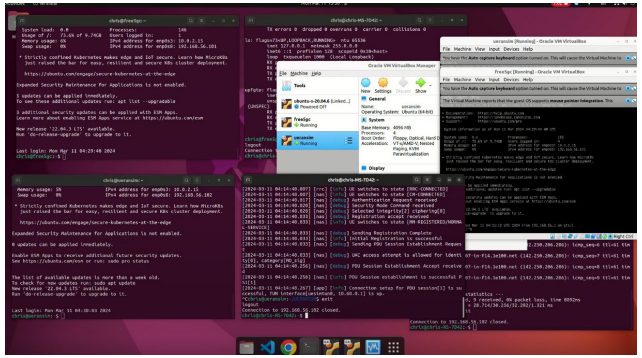
What we learned

- We learned the main concept of the Free5GC to communicate via 5G networks.

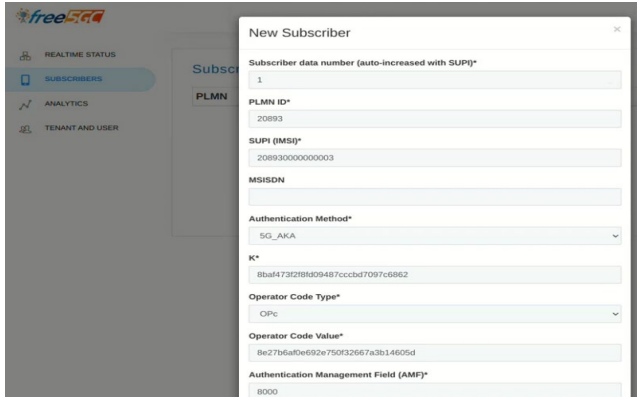
- We learned the setting of the configuration between Free5GC and UERANSIM and how to make communications via 5G networks.

Demonstration of MONM

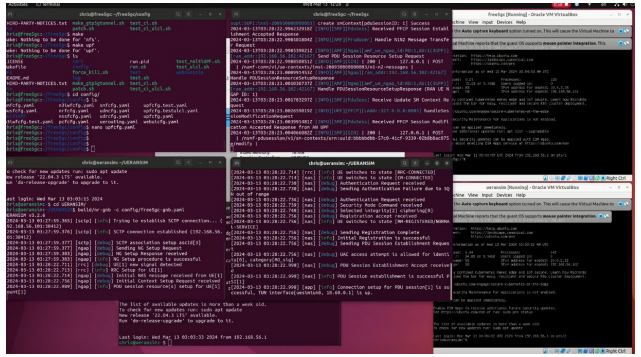
[URL] https://www.youtube.com/watch?v=881ji0AsN7c&list=PLSd4MXSO7VifHLtETuyffZtsEAb6ed_Lq&index=1



Running Free5GC and UE(IoT device) and all 5G network functions



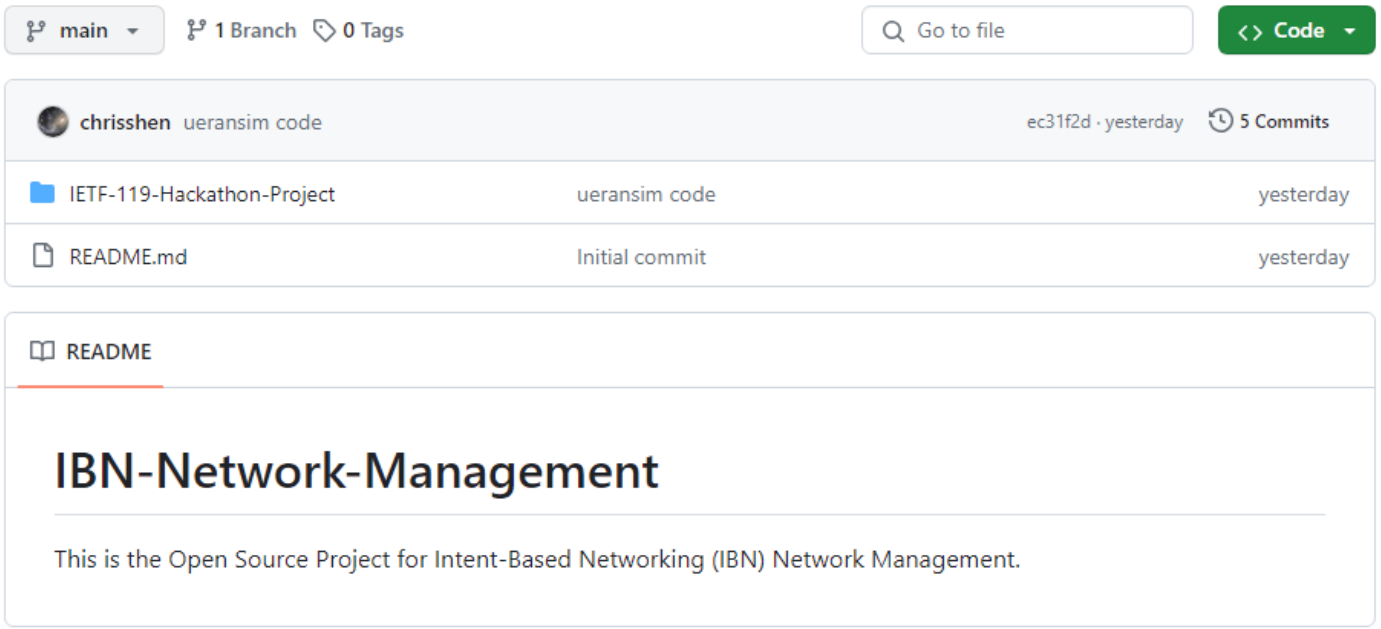
Register UE on 5G Core Network(IoT server)



Communication between UE(IoT device) and IoT server

Open Source Project for MONM

URL: https://github.com/jaehoonpauljeong/IBN-Network-Management



Highlights

Conclusion and Future Work

- We learned how to set up **5G RAN and Core Networks for Mobile Object Network Management (MONM)** this time.
- In IETF 120, we will develop the V2X Scenario and **IBN-Based Network Management** through 5G networks.
- Also, we will support the **Interaction between Free5GC as Cloud/Edge and SDV with AUTOSAR** in Matlab Simulink as SDV with Cloud-Native.

Wrap Up

Hackathon Team

- **Professors:**
  - **Jaehoon (Paul) Jeong (SKKU)**
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  - **Younghan Kim (SSU)**
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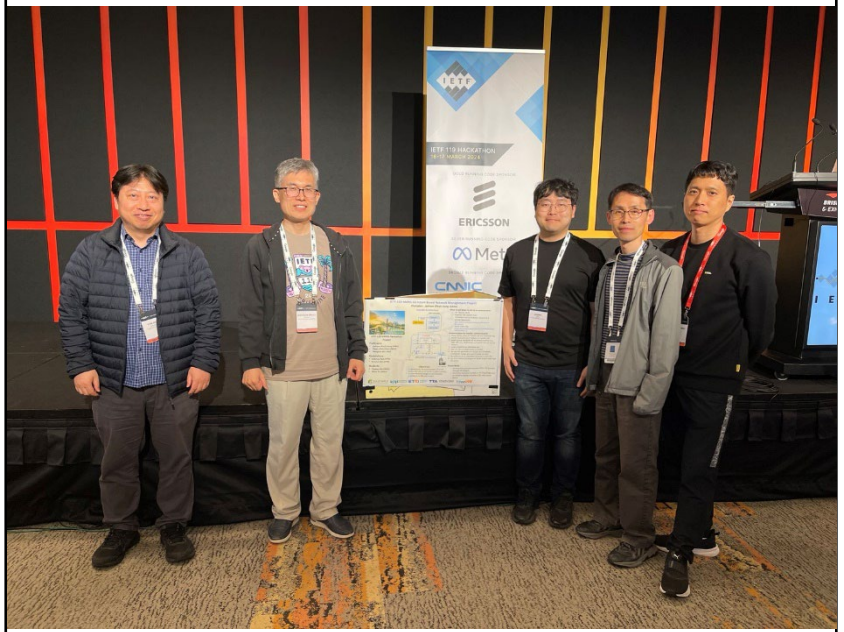
Hackathon Team Photo



Appendix

(1) Building Free5GS from Source documentation

(2) UERANSIM, Golang, and MongoDB documentation

Simulation Environment

- OS: Ubuntu 20.04
- Free5GC VM: version 3.4.1
- UERANSIM VM (UE & RAN): version 3.2.6
- Open Source:
  - Free5GC: https://free5gc.org/guide/3-install-free5gc/
  - UERANSIM: https://github.com/aligungr/UERANSIM/blob/master/README.md