Feng Tu

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Profile

Master's student in Institute of Artificial Intelligence Innovation at National Yang Ming Chiao Tung University, currently conducting 5G core network research in the WIRE Lab under the supervision of Prof. Jyh-Cheng Chen. Experienced in maintaining and developing free5GC, focusing primarily on SMF (Session Management Function) and web console development. Also responsible for managing the free5GC repositories to ensure code quality and collaboration efficiency.

Skills

- Programming Languages: Go, C/C++, TypeScript
- Frontend: React, Vue, Angular
- Database: MongoDB, bboltDB
- DevOps & Tools: Linux, Bash, Docker, Git, CI/CD
- AI-augmented development experience (e.g., ChatGPT/Cursor)

Experience

Part-time Research Assistant Apr. 2024 – Sep. 2025
Research Center for Information Technology Innovation, Academia Sinica

- Contributed to the research and development of OpenZiti, a cutting-edge Zero Trust networking platform.
- Translated the Openziti console into language switching friendly between English and Chinese under Angular framework.
- Developed a cross-platform client agent using Electron (Vue) and Go (Gin, bboltDB) to enhance security and usability.

Committer Sep. 2024 – Present
free5GC

- Review pull requests, fix bugs, and ensure high-quality code contributions.
- Update dependencies and release new versions of repositories, maintaining project stability.
- Contribute to key functionalities across SMF and core modules.

Intern Sep. 2024 – Present
Saviah

- Maintain and enhance SMF and web console by promptly resolving bugs and ensuring system stability.
- Developed custom profile management and identity information validation features in the web console to improve user experience.
- Created a CI-test repository using Docker Compose to automate and streamline ULCL procedure testing.

Teaching Assistant
National Yang Ming Chiao Tung University

- **Cryptography Engineering** Spring 2024 & Spring 2025
  Instructor: Prof. Chih-Jen Hsieh
  Dept. of course offering: Institute of Network Engineering
- **Entrepreneurship Realization** Spring 2025
  Instructors: Prof. Jyh-Cheng Chen, Prof. Bob Hsieh
  Dept. of course offering: Institute of Multimedia Engineering
- **Open-Source Core Network Design and Implementation** Fall 2025
  Instructors: Prof. Jyh-Cheng Chen, Yi Chen
  Dept. of course offering: Institute of Network Engineering

Education

M.S. in Institute of Artificial Intelligence Innovation Sep. 2024 – Present (Expected Dec. 2025)
National Yang Ming Chiao Tung University
B.S. in Computer Science Sep. 2020 – Jun. 2024
National Yang Ming Chiao Tung University

Master's Thesis

Supporting New Radio Dual Connectivity (NR-DC) in the free5GC Core Network
Advisor: Prof. Jyh-Cheng Chen, WIRE Lab
Designed and implemented NR-DC support within the free5GC Session Management Function (SMF), enabling a single PDU session to establish and manage two GTP-U tunnels distributed between master and secondary gNBs. This enhancement allows simultaneous dual-path data transmission and offers a lightweight, reproducible platform for researchers to explore NR-DC mechanisms in open-source 5G core networks.

Side-Projects

free-ran-ue (https://github.com/Alonza0314/free-ran-ue)
A gNB and UE simulator for NR-DC in free5GC.

- Core Functionalities:
  1. UE Registration, Authentication and De-registration
  2. PDU Session Establishment, Modification and Release
  3. Xn Signaling Processing (between gNBs)
  4. Direct User and GTP Packet Manipulation
  5. UI Console for gNB and UE Management (React framework)
- Key Features:
  1. **Userspace GTP-U (U-GTP-U) Implementation**: process GTP packet at user space without using gtp5g.
  2. **Xn Interface Signaling Processing**: flexible gNB's Xn interface can be used for configuring UE's second tunnel.
  3. **Web Console Management**:Both gNB and UE can be registered in the console. It offers a comprehensive control dashboard for managing the entire RAN/UE system.
  4. **Multi-deployment scenario**:
     (a) Standalone (gNB at one machine, UE at one machine)
     (b) Namespace-based (use namespace to separate IP conflicts)
     (c) Docker Compose (containerize and orchestrate multiple services for easy deployment)
  5. **Github Page deployment**: Complete project introduction and friendly user guide. https://alonza0314.github.io/free-ran-ue/

dp-tcp (https://github.com/Alonza0314/dp-tcp)
Dual Path TCP: An application for dual path TCP

- Based on TWO TCP connections to establish a redundant reliable application connection.
- At duplication, it duplicates the packet read from customized network interface and write to both TCP links.
- At elimination, dp-tcp used a **hashmap** to store packet record. The record stored in the map is not the original raw packet since it may be very large. dp-tcp used **xxhash**, a quick hash function, for hashing the packet into an uint64 value, which making it easy to store.

(Other minor tools and contributions listed on Github)