

RL Based 6G Cellular Access Network Scheduler

Abstract

As the demand for mobile high bandwidth – low latency is increasing, the access network must become smarter and automatically adapt to rapid changes. A scheduler is a module that observes the network, receive traffic requests from all users and allocates a bandwidth and a specific route to each requested connection.

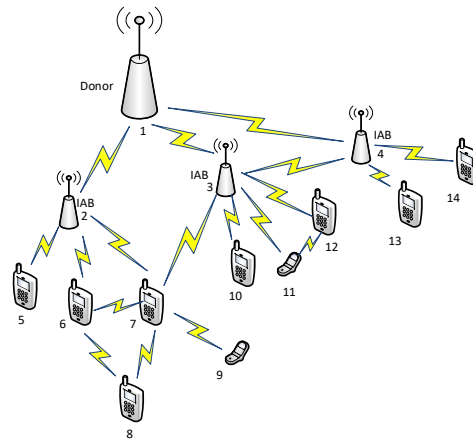


Fig. 1: 5G Example Access Network

In order to accomplish the scheduling task quickly and efficiently, you will develop a Reinforcement Learning based scheduler that observes the network (the environment), receives traffic requests and allocates route and bandwidth to each traffic request. The main focus of this semester's project is to develop an OMNET++ simulator that will be used as the digital twin of the real-world 6G access network and replace the Rutenet model that was used in last semester project.

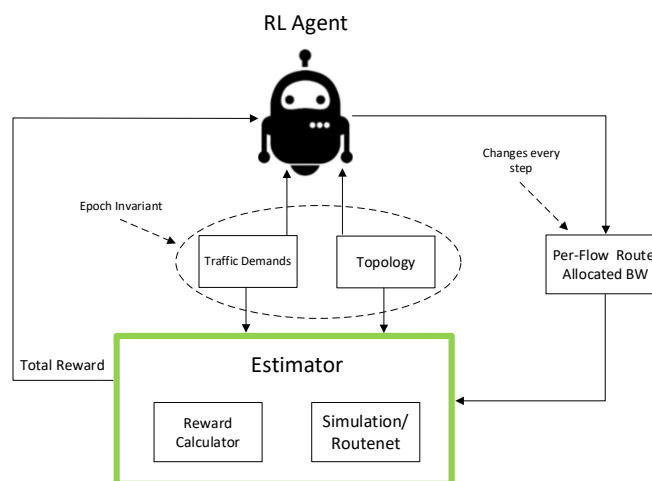


Fig. 2: Reinforcement based Learning Scheduler

Project objective

Continue last semester project

Project overview and milestones

1. Ramp-up last semester project [1].
2. Train the Routers -Fermi GNN to predict per-flow latency with >99% accuracy.
3. Train the DDPG agent to minimize the normalized per-flow latency.
 - a. Compare the pre and post training performance.
4. CDR – 03.04.2023
 - a. Present results of steps 1,2, and 3 if time allows
 - b. Present the re-designed reward
 - c. Present work plan for the rest of the semester
5. Prioritize single source-destination flows by re-design the reward accordingly.
6. Repeat step 3 the prioritized policy of step 4.
7. Final Presentation and Draft for Final report and Poster – 26.06.2023

Notes

- The above list is an estimate. Goals and tasks may be modified during the first few weeks of the projects before the CDR (Critical Design Review) at week 4 of the semester.

General requirements for all LCCN Projects are specified at the lab website:

<https://lccn.cs.technion.ac.il/lab-courses/>

Prerequisites:

1. Introduction to computer networks (236334) – Mandatory.
2. Reinforcement Learning background (for at least one of the team members)

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References:

- [1] https://gitlab.cs.technion.ac.il/lccn/sp2022_routenet_scheduler
- [2] https://gitlab.cs.technion.ac.il/lccn/w2021-2022_omet_sim_for_routenet
- [3] <https://omnetpp.org/>