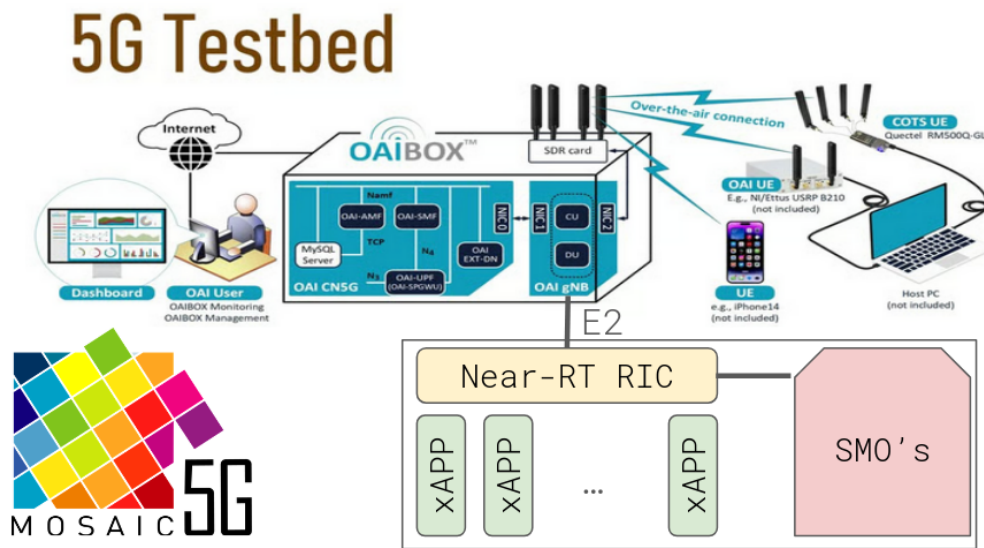


Investigation of 5G E2 Interface for 5G-TSN using OAI Box and FlexRIC

Project topic adaptable for Oberseminar, Student Thesis, Bachelor, or Master/Diploma-Thesis



Objective of Work

Industrial and real-time applications demand communication systems with guaranteed latency, reliability, and time synchronization. While 5G introduced URLLC features to address such requirements, achieving the deterministic behavior of Time-Sensitive Networking (TSN) over 5G remains a challenge.

A key factor lies in the Radio Access Network (RAN), which strongly impacts latency, jitter, and reliability in wireless transmission. To meet TSN requirements, the RAN must be dynamically configurable and responsive to changing traffic conditions.

The O-RAN architecture provides a promising solution by enabling intelligent RAN control through the E2 interface. This allows near-real-time adaptation of radio resources via eXtended applications (xApps), supporting flexible scheduling and precise control essential for TSN traffic.

Investigating such mechanisms in a testbed or emulation environment, for example with OpenAirInterface, can provide valuable insights into the feasibility of deterministic communication over 5G. The results can guide both academic research and industrial adoption, while also laying foundations for future 6G systems with native TSN support.

Focus of Work

In the thesis, the following tasks should be addressed:

- literature research on RAN configuration via RIC applications and 5G-TSN procedures
- design of a testbed to study the performance (of selected KPIs) of near real-time RAN configuration in 5G cellular networks
- implementation of the testbed using OAI-Box or as an emulation
- measurement, analysis, discussion
- documentation of the work in a scientific way
- presentation of the results in a scientific way

In the thesis, the following tasks can be addressed if time allows:

- Prototype a simple xApp that maps TSN stream requirements to RAN configuration parameters via the E2 interface
- Demonstrate basic control, e.g., adapting scheduling or resource allocation to TSN traffic
- Evaluate the xApp's impact on selected KPIs against a baseline scheduler.

Material for Further Reading

- <https://www.oaibox.com/>
- <https://www.o-ran.org/>
- <https://5g-acia.org/whitepapers/integration-of-5g-with-time-sensitive-networking-for-industrial-communications/>
- Hands-on tutorial: <https://gitlab.eurecom.fr/oai/trainings/oai-workshops>

Keywords

3GPP 5G/6G, RIC, O-RAN, emulation, testbed, literature study

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