HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

O-RAN 7.2 CAMPUS NETWORK: AN EXPERIENCE PAPER

FELIX KAHMANN, 29. ITG-FACHTAGUNG MOBILKOMMUNIKATION, 21.05.2025, OSNABRÜCK

WIR FÜR MORGEN.

REQUIREMENTS FOR A UNIVERSITY CAMPUS NETWORK

- Undisturbed frequency → No ISM band
- Flexibility. → Open HW / SW
- Automation and easy usage.
- Low latency capability possible when needed.

https://www.hs-osnabrueck.de/forschung/recherche/laboreinrichtungen-und-versuchsbetriebe/labor-fuer-hochfrequenztechnik-und-mobilkommunikation/

- Area: Currently around 4800 m^2. Complete Campus of 82.850 m^2.

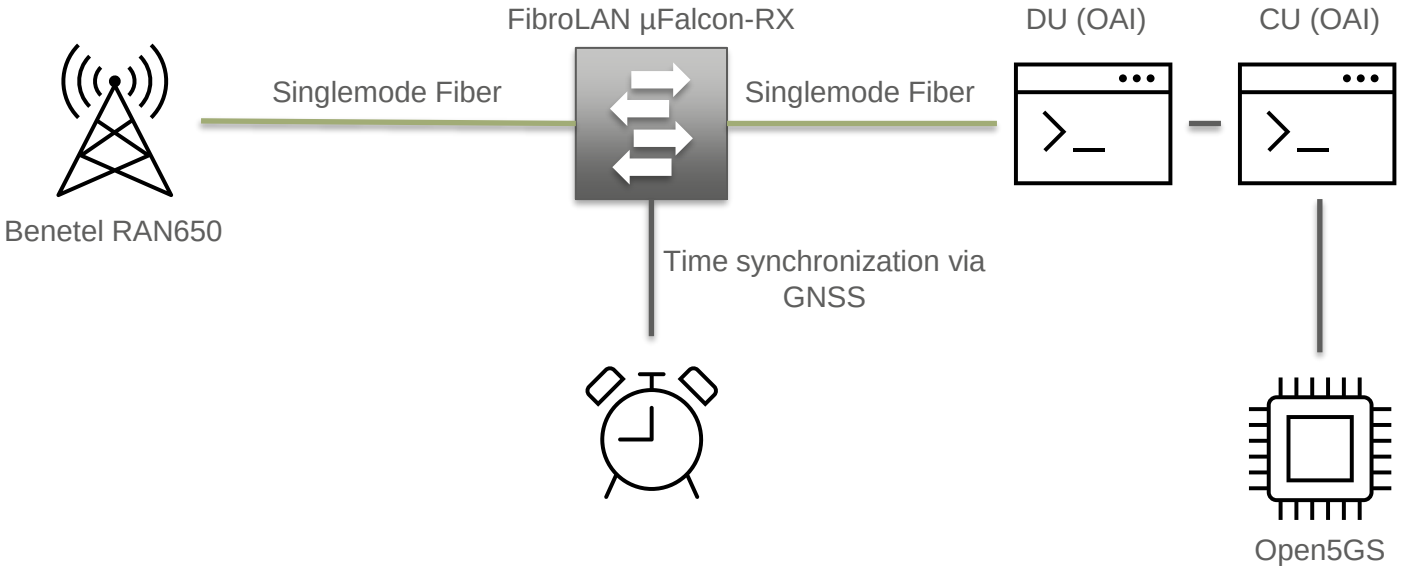
SETUP

- Setup of core network and the gNB (DU and CU).

- Establishment of the fronthaul
  - Time synchronization between DU and Radio Unit
  - Configuration of the Radio Unit

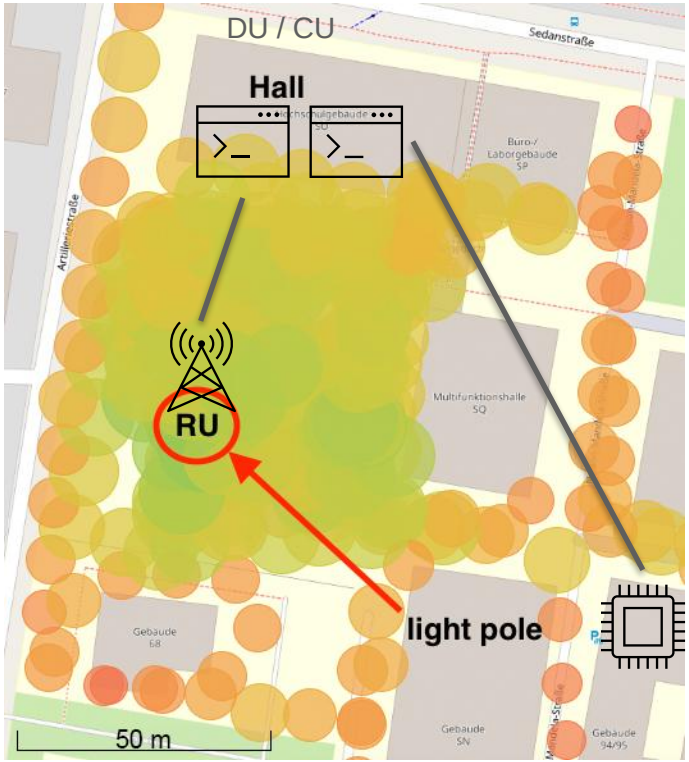
ARCHITECTURE

Architecture



COVERAGE

- Coverage of the designated area.
- Best coverage when line of sight was available.
- Indoor coverage was possible as well.
- Measurements with smartphone (OnePlus 9 LE2113)



MEASUREMENT

Radio Measurement Results

Parameter	Min	Max	Mean	σ
RSRP [dBm]	-123	-66	-93.87	10.18
RSRQ [dBm]	-14	-11	-11.1	0.4
SINR [dBm]	1	33	25.39	6.9

MEASUREMENT

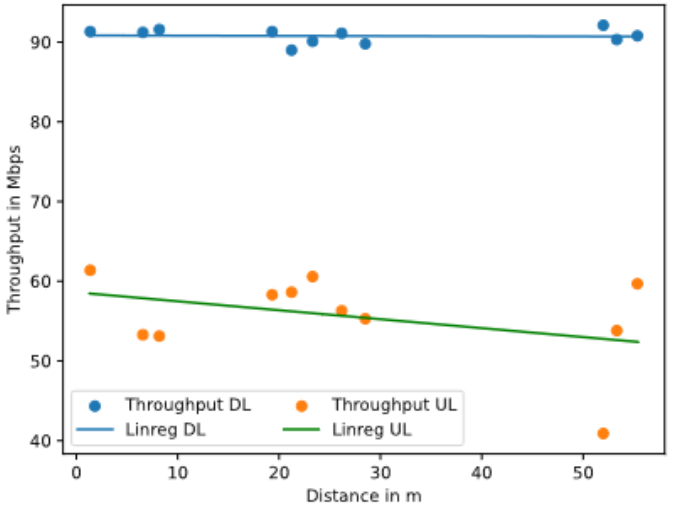
Throughput & Latency Measurement Results

Parameter	Min	Max	Mean	σ
Throughput downlink [Mbps]	89.2	92.1	90.78	0.9
Throughput uplink [Mbps]	40.9	61.4	55.57	5.68
Latency (ping) [ms]	45	64	52.64	5.1

MEASUREMENT RESULTS

- Up- and downlink throughput measurement.
- Throughput depending on the distance.

- Uplink at most $\frac{2}{3}$ of downlink.
- Downlink decreases slower than uplink.
  - Reason might be the downlink favored TDD pattern.



EXPERIENCE AND CONCLUSION

- Network has been successfully built.
- Straight forward setup.
- Network management involves a lot of manual work.
- OAI stability increased by own scripts for network performance.
- Fair network performance.
  - Finetuning needed.
  - Different antenna setup planned.

CAMPUS NETWORK EXTENSION

Stage 1
- One gNB

Stage 2
- Second gNB with handover

Stage 3
- Additional two nomadic base stations for agricultural scenarios

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THANK YOU FOR YOUR ATTENTION

QUESTIONS AND REMARKS

Authors:

Felix Kahmann, M.Sc. felix.kahmann@hs-osnabrueck.de (Corresponding author)
Dr. rer. nat. Julian Dreyer j.dreyer@hs-osnabrueck.de
Prof. Dr.-Ing. Ralf Tönjes r.toenjes@hs-osnabrueck.de