

Duranta OAI UE and OCUDU RAN Interoperability and ISAC Operation

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Outline

Introduction to the LFN Duranta Project @ Robert

Introduction to the OCUDU Project @ Matt

Duranta OAI UE Overview & Interoperability work @ Robert

Demos @ Robert

- Deploying RAN&UE locally

- Over-the-air setup

ISAC work and next steps @ Matt

Q&A @ Matt&Robert

Introduction to the LFN Duranta Project @ Robert

- ▶ Linux Foundation Networking (LFN) incubation project
- ▶ Open source RAN&UE reference stack
- ▶ Built with seed code of OpenAirInterface

Mission

- ▶ Develop reference RAN&UE stack
- ▶ Tooling, documentation, and validation for repeatable and reproducible deployments/experimentation
- ▶ Progress toward deployment-ready software

Scope

- ▶ Done:
 - ▶ RAN&UE ("openairinterface5g")
 - ▶ Operations&Management (notably: FlexRIC)
- ▶ Later: Core Network

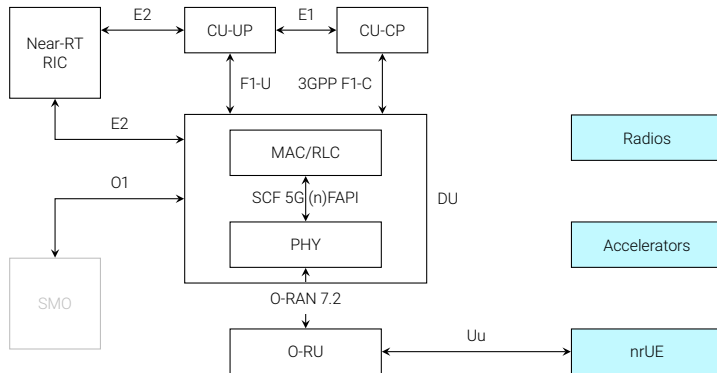
Software provided in Duranta OpenAirInterface

Radios

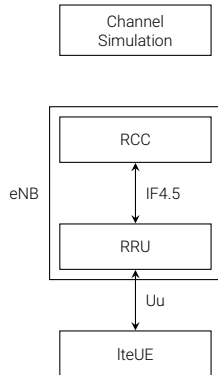
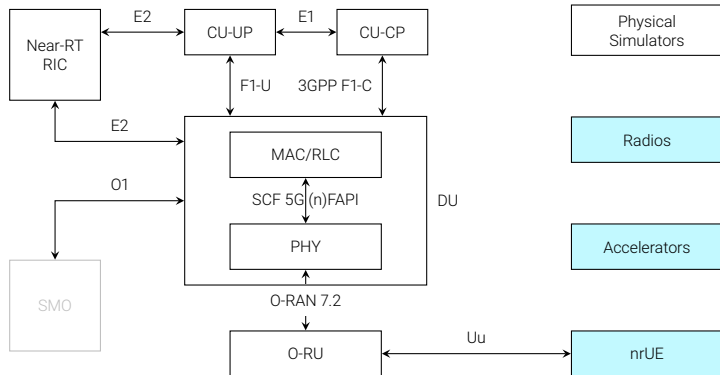
Accelerators

nrUE

Software provided in Duranta OpenAirInterface

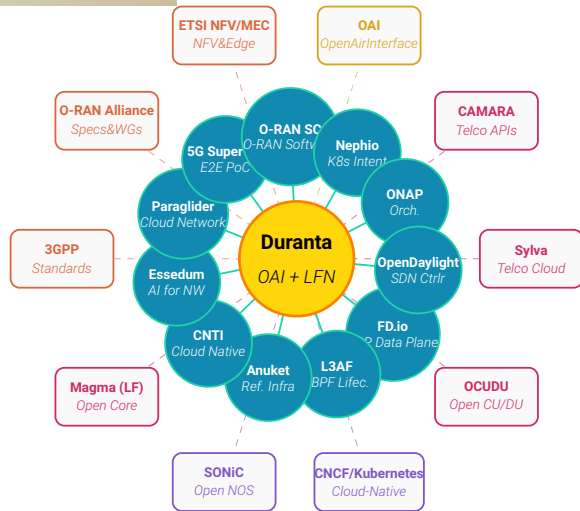


Software provided in Duranta OpenAirInterface



Duranta and the broader ecosystem

- ▶ The project that can bring all LFN++ projects together
- ▶ E2E 5G+ networks from LFN
- ▶ Plurality and Synergy



Introduction to the OCUDU Project @ Matt

Duranta OAI UE Overview & Interoperability work @ Robert

UE General Feature Set

OAI UE – interoperable with COTS equipment

Radio

- ▶ FR1, FR2 (experimental)
- ▶ Bandwidths: 10-100MHz; 256-QAM
- ▶ Support for SISO, MIMO 2 layers UL/DL experimental
- ▶ Throughput: [up to 230 Mbps](#) (DL), [up to 140 Mbps](#) (UL)
- ▶ Latency: configurable minimum RX-to-TX latency

Complete Feature Set: [doc/FEATURE_SET.md](#) (in the repository)

OAI UE General Feature set

Functional

- ▶ Can support up to 10 UEs per process (Only RFsim)
- ▶ Uses FAPI-inspired L1/L2 interface ("UE FAPI")
- ▶ RRC Connection Setup/Reestablishment, Measurements, HO
- ▶ IP/Ethernet PDU sessions
- ▶ Look-aside accelerators (see later)
- ▶ NTN LEO/GEO

RAN Interoperability

- ▶ OAI gNB
- ▶ OCUDU gNB
- ▶ Nvidia Aerial RAN (L1)
- ▶ COTS: Ericsson, Nokia (partially)

OAI UE Performance (2026)

- ▶ Measurements on Nvidia DGX Spark (ARM), but translate to x86 as well
- ▶ Using N310/x400 with UHD 4.9 and DPDK 24.11
- ▶ 100 MHz: max DL 230 Mbps, UL 118 Mbps (SISO)
- ▶ 40 MHz: max DL 85 Mbps, UL 46 Mbps (SISO)

Radio Platforms

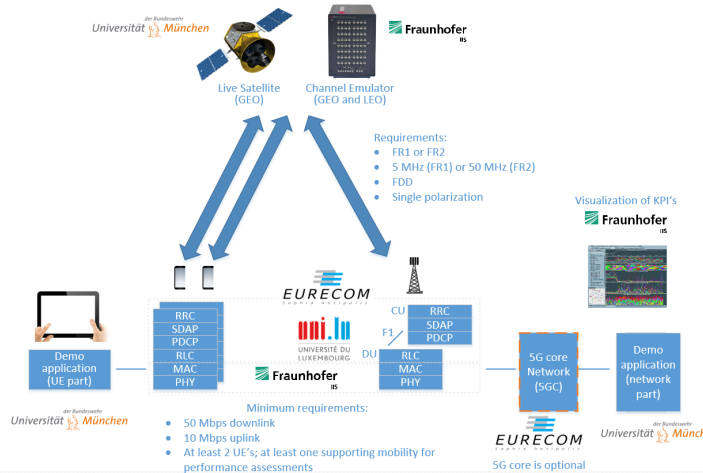
- ▶ USRP through UHD (split 8): B210, N3xx, x400
- ▶ BladeRF (split 8)
- ▶ LimeSDR (split 8)
- ▶ Simulation: RFsim (non-RT), vrtsim (RT), ZeroMQ (non-RT)

Look-aside: O-RAN AAL

- ▶ O-RAN AAL (bbdev-based): AMD/Xilinx T2 card, Intel ACC200/vRAN Boost; [Documentation](#)
- ▶ GPU LDPC offload: with CUDA-compatible GPUs; [Documentation](#)
- ▶ OpenRadioSystems Aurora over PCIe XDMA [Documentation](#)
- ▶ Accelerators can be used in [simulators](#) or [softmodems](#) (UE/gNB, any radio)

Support for NTN (through community)

- ▶ Projects funded by ESA:
5G-GOA/5G-LEO/6G-LINO
- ▶ Forward data over relay GEO satellite, or emulator (LEO)
- ▶ Continuous freq. offset compensation, UL Timing
- ▶ SNR measurement, CSI Reporting
- ▶ AMC without HARQ feedback
- ▶ Handover



Testing

- ▶ Physical Simulators: on x86, ARM, [Documentation](#)
- ▶ Unit-Tests, [Documentation](#)
- ▶ End-to-end tests: [Documentation](#), [Jenkins](#)
- ▶ Hardware-based tests: against OAI gNB, Aerial L1, with USRP

UE Roadmap

Finalized 2026

- ▶ Handover Procedures
- ▶ Interoperability with OCUDU gNB
- ▶ NTN LEO/GEO

Ongoing 2026

- ▶ Reduced feedback time
- ▶ Interop. with 3rd-party gNBs
- ▶ Performance Improvements
- ▶ Sidelink Mode 2

Future 2027

- ▶ PRS (DL Localization)
- ▶ Power control procedures for outdoor operation
- ▶ RU sharing
- ▶ Freq.Domain Interface

Status of Interoperability

- ▶ End-to-end connection between OAI UE+OCUDU gNB+Core
- ▶ Fully virtualized (ZMQ) or radio (see demos)
- ▶ ZMQ CI test (on Duranta OAI Github)
- ▶ Tutorial on interoperability (on OCUDU docs)

Major Milestones

- ▶ UCI on PUSCH: OAI UE to send CSI reports on PUSCH (!3766, Feb 2026; #139)
- ▶ Virtual radio: integration of ZeroMQ radio library in Duranta OAI (!3975, May 2026)
- ▶ TRS: UE can track and correct frequency offset (#199, July 2026)
- ▶ Various smaller fixes for stability, e.g., PUCCH (#224, #438), reestablishment (#326), ...

Demos @ Robert

Deploying RAN&UE locally

- ▶ Easiest: Clone Duranta OAI repository, then

```
cd ci-scripts/yaml_files/5g_zmq_radio_1x1_ocudu/  
docker compose up -d
```

(almost)



Deploying RAN&UE locally

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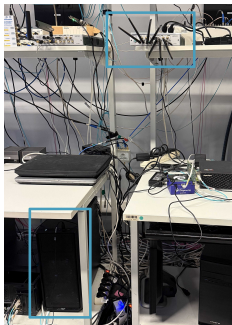
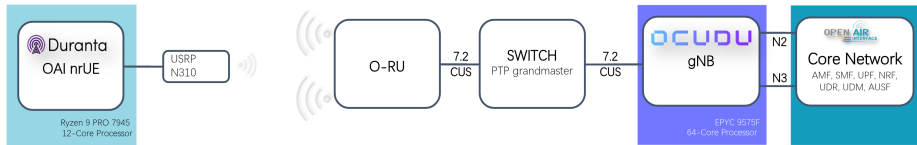
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docker compose up -d
```

(almost)



- ▶ If you want to do modifications: compile by hand and use existing configs, or follow <https://docs.ocudu.org/tutorials/oaiue/>
- ▶ Could be extended, e.g., with GnuRadio for channel simulation, or NTN (see [OAI NTN documentation](#))

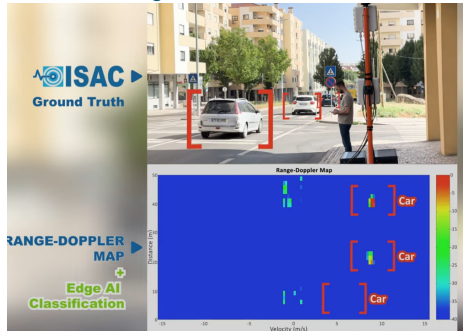
Over-the-air setup



ISAC in OAI

- ▶ T tracer provides hooks to access signals, events, ..., on the gNB/UE → [Documentation](#)
- ▶ dApp framework integration for gNB ongoing → [Documentation](#)
- ▶ Localization:
 - ▶ Existing support for SRS
 - ▶ PRS in L1 (full support on roadmap)

▶ Use of OAI gNB for ISAC



▶ OAI/AllBeSmart Webinar

ISAC work and next steps @ Matt

Q&A @ Matt&Robert

Thank you!
Q? A!