
Overview of the Duranta Project

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Outline

The Duranta Project

Duranta Subprojects

OpenAirInterface RAN+UE

FlexRIC

Upcoming: 5GC

The Duranta Project

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

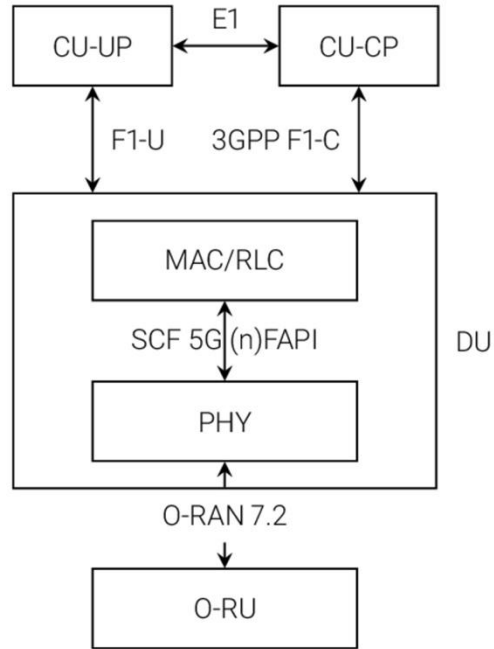
Mission

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

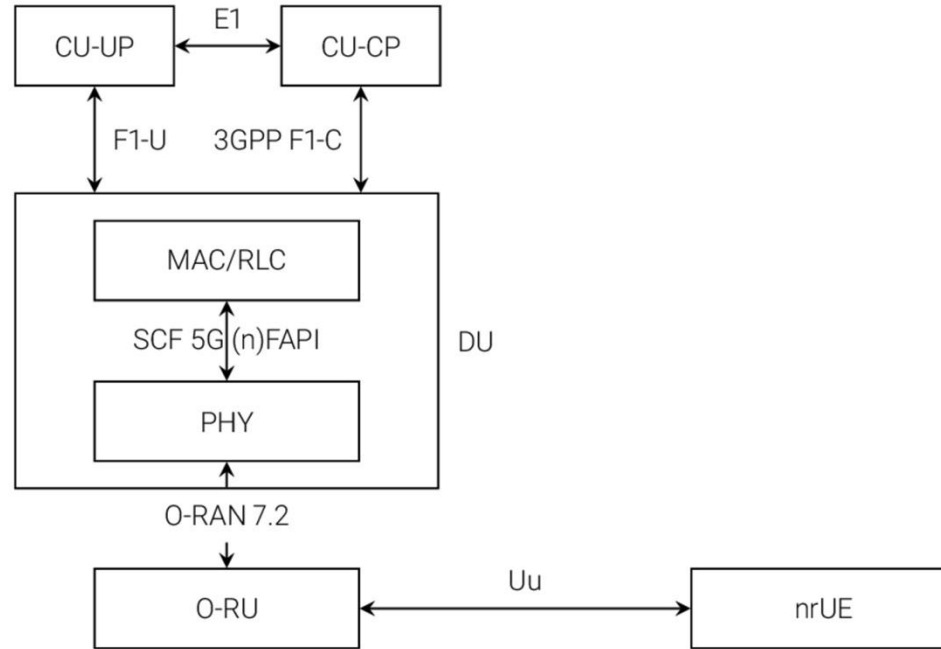
Scope

- ▶ Projects migrated:
 - ▶ RAN&UE (“openairinterface5g”)
 - ▶ Operations&Management (notably: FlexRIC)
- ▶ Later: Core Network

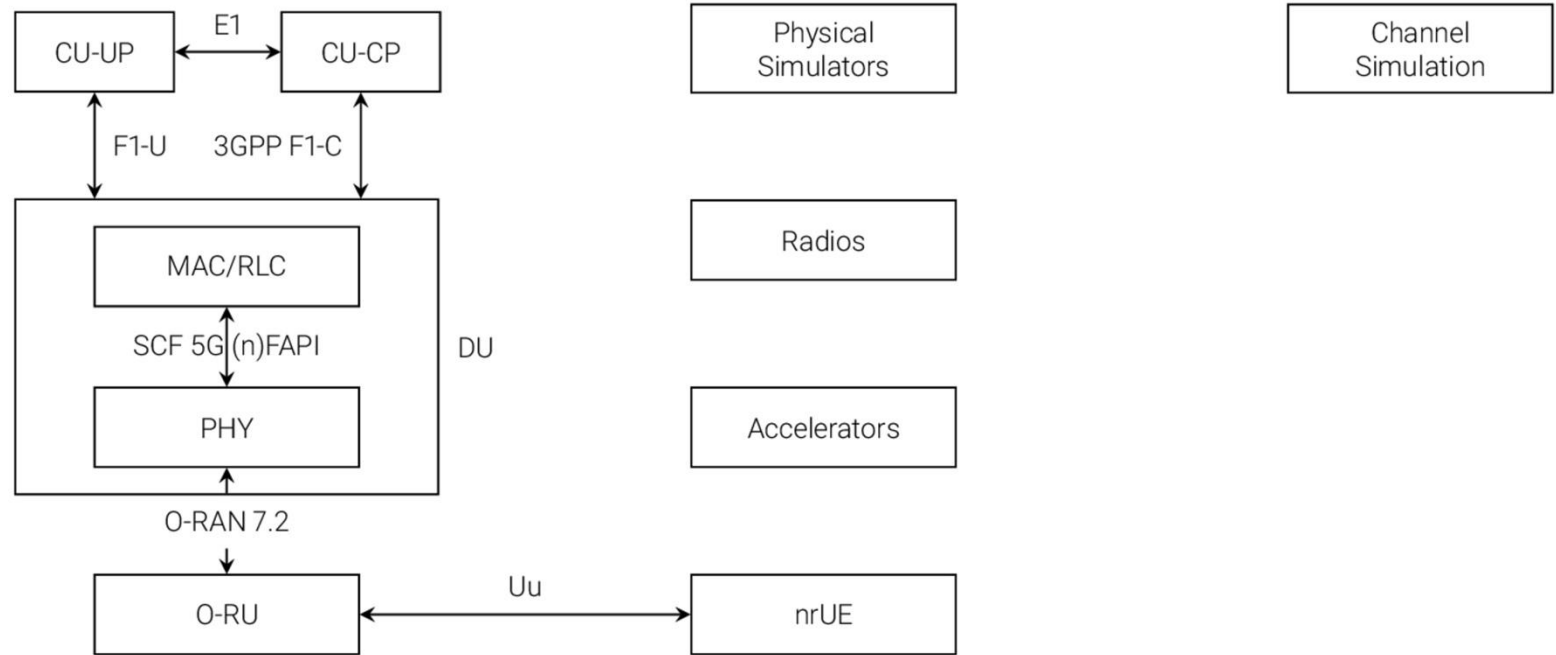
Software provided in Duranta OpenAirInterface



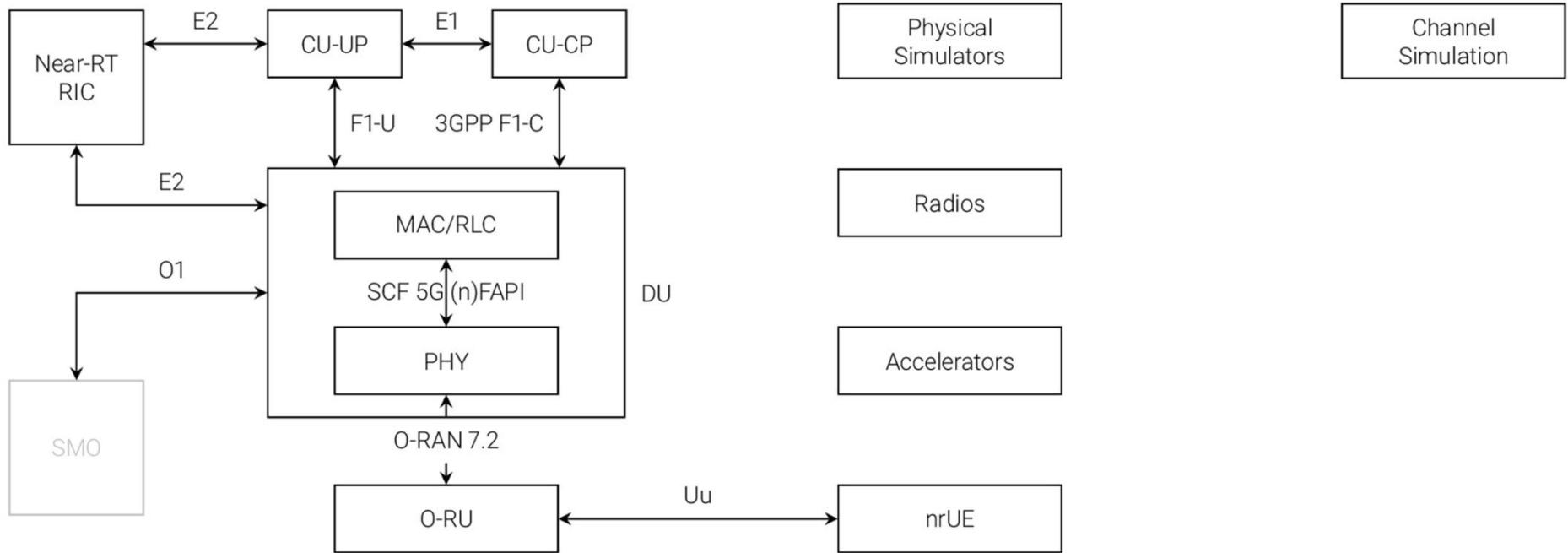
Software provided in Duranta OpenAirInterface



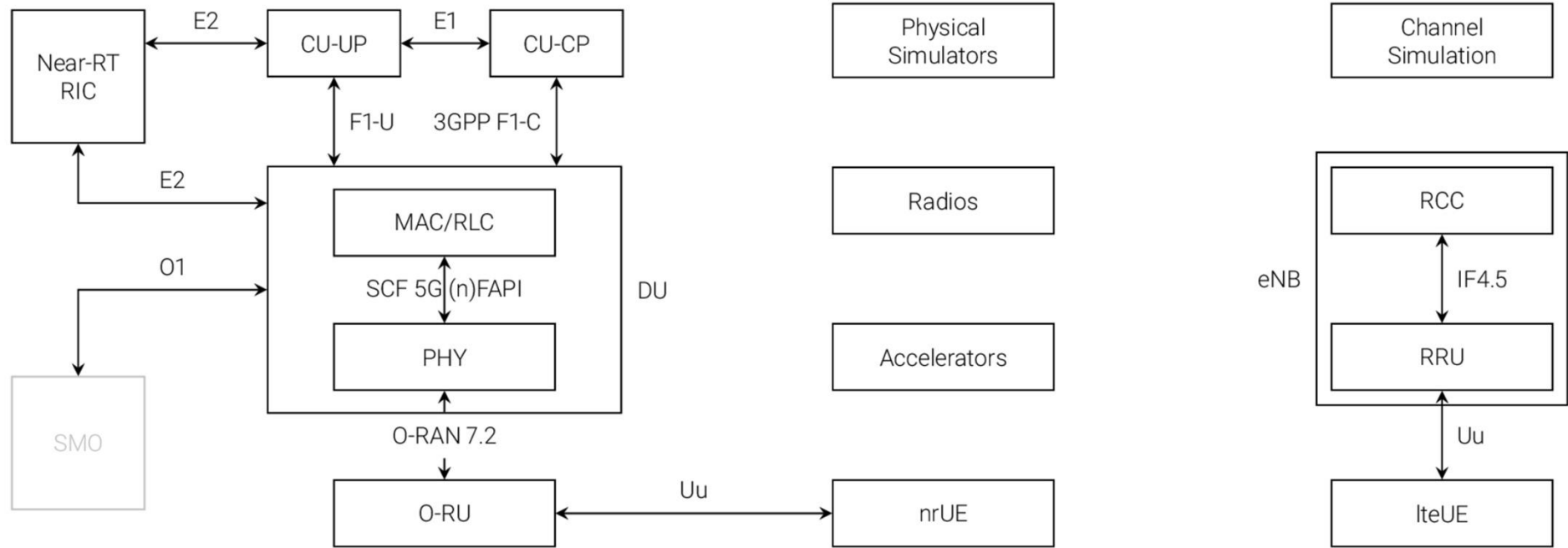
Software provided in Duranta OpenAirInterface



Software provided in Duranta OpenAirInterface

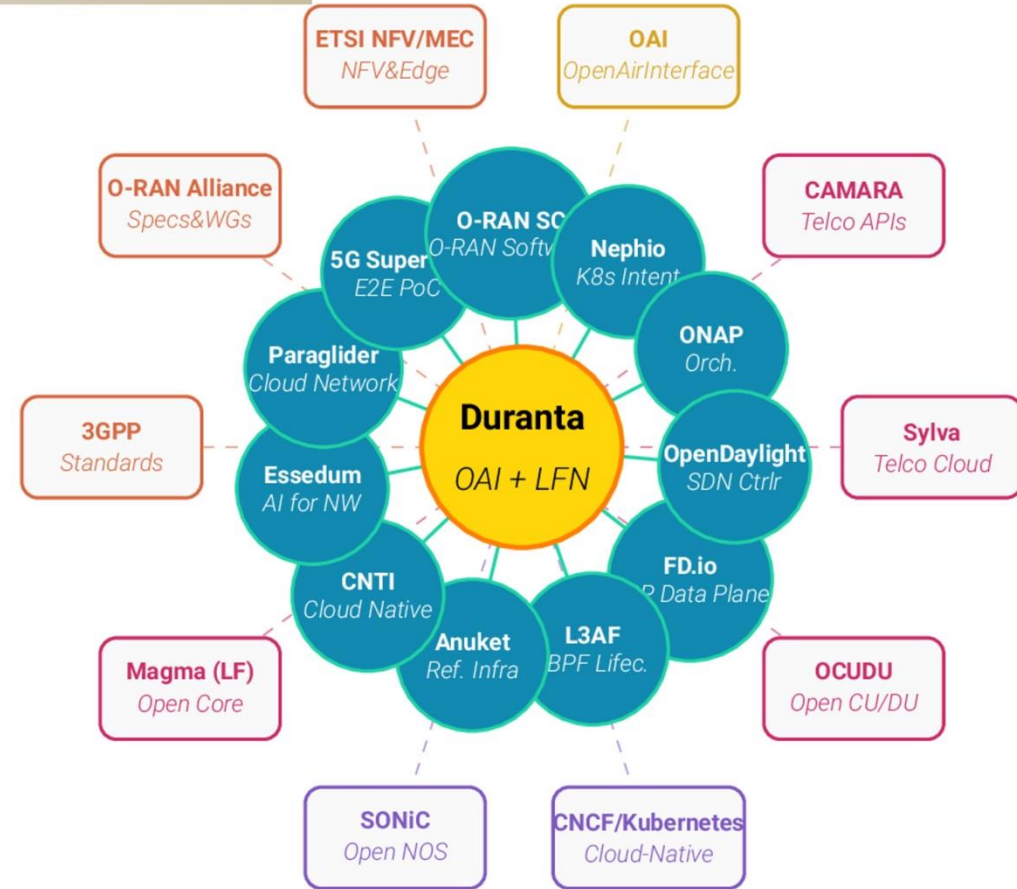


Software provided in Duranta OpenAirInterface



Duranta and the broader ecosystem

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



Duranta Subprojects

RAN General Feature Set

Radio

- ▶ FR1, FR2
- ▶ Bandwidths: 10-200MHz; 256-QAM
- ▶ MIMO: DL 4 layers, UL 2 layers
- ▶ Throughput: 1.4 Gbps (DL), 400 Mbps (UL), depends on TDD config
- ▶ Latency: down to 5 ms RTT (application, depends on TDD config)

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

RAN General Feature Set

Functional

- ▶ Up to 128 UEs* supported
- ▶ Support for 3GPP/O-RAN/SCF interfaces
 - ▶ Multiple DUs and CU-UPs at one CU-CP
 - ▶ E2 agent through FlexRIC
 - ▶ Front-/Midhaul
 - ▶ O1 interface through O1 adapter
- ▶ Inline/look-aside accelerators (see later)
- ▶ NTN LEO/GEO, RedCap initial support

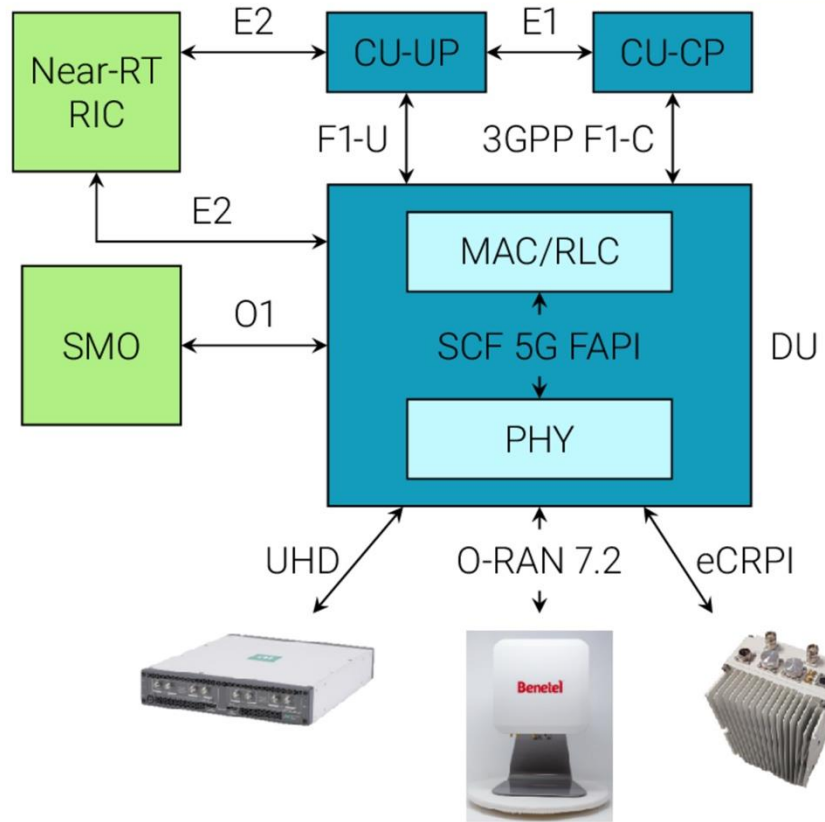
Tested (COTS) UEs (selection)

- ▶ Quectel modems
- ▶ Samsung S25
- ▶ iPhone 14-17
- ▶ Pixel 8, 9, 10

Tested 5GC

- ▶ OAI 5GC
- ▶ Open5GS, Free5GC
- ▶ SABOX, Amarisoft, others...

O-RAN/3GPP/SCF splits



- ▶ **O1**: Integration with ONAP-based SMO
- ▶ **E2**: Supported through E2 Agent and FlexRIC
- ▶ **E1**: Multiple CU-UPs per CU-CP
- ▶ **F1**: Multiple DUs per CU
- ▶ **FAPI**: all* L1 procedures SCF 5G FAPI 222.10.02; Nvidia Aerial RAN interoperability; nFAPI
- ▶ **Fronthaul**: various split 7.2/split 8 options, see later

RAN Roadmap

Finalized 2026

- ▶ NR Dual Connectivity
- ▶ GPU LDPC Offload
- ▶ CN paging procedures
- ▶ Cat-A Software O-RU

Ongoing 2026

- ▶ Support for 128 UEs
- ▶ Xn handover procedures
- ▶ Uplink MU-MIMO
- ▶ QoS & Slicing
- ▶ Cat-B Software O-RU

Future 2027

- ▶ PRS (DL Localization)
- ▶ Downlink MU-MIMO based on SRS
- ▶ NTN enhancements (FR2, MEO, ...)

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)

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

Radio Platforms

- ▶ O-RAN 7.2 CUS-plane (with Benetel, LITEON, VVDN, Metanoia, Foxconn), CUSM-plane with Benetel [gNB only]
- ▶ eCPRI with AW2S (split 8) [gNB only]
- ▶ USRP through UHD (split 8): B210, N3xx, x400
- ▶ BladeRF (split 8)
- ▶ LimeSDR (split 8)
- ▶ Simulation: RFsim (non-RT), vrtsim (RT), ZeroMQ (non-RT)

Accelerators

In-line

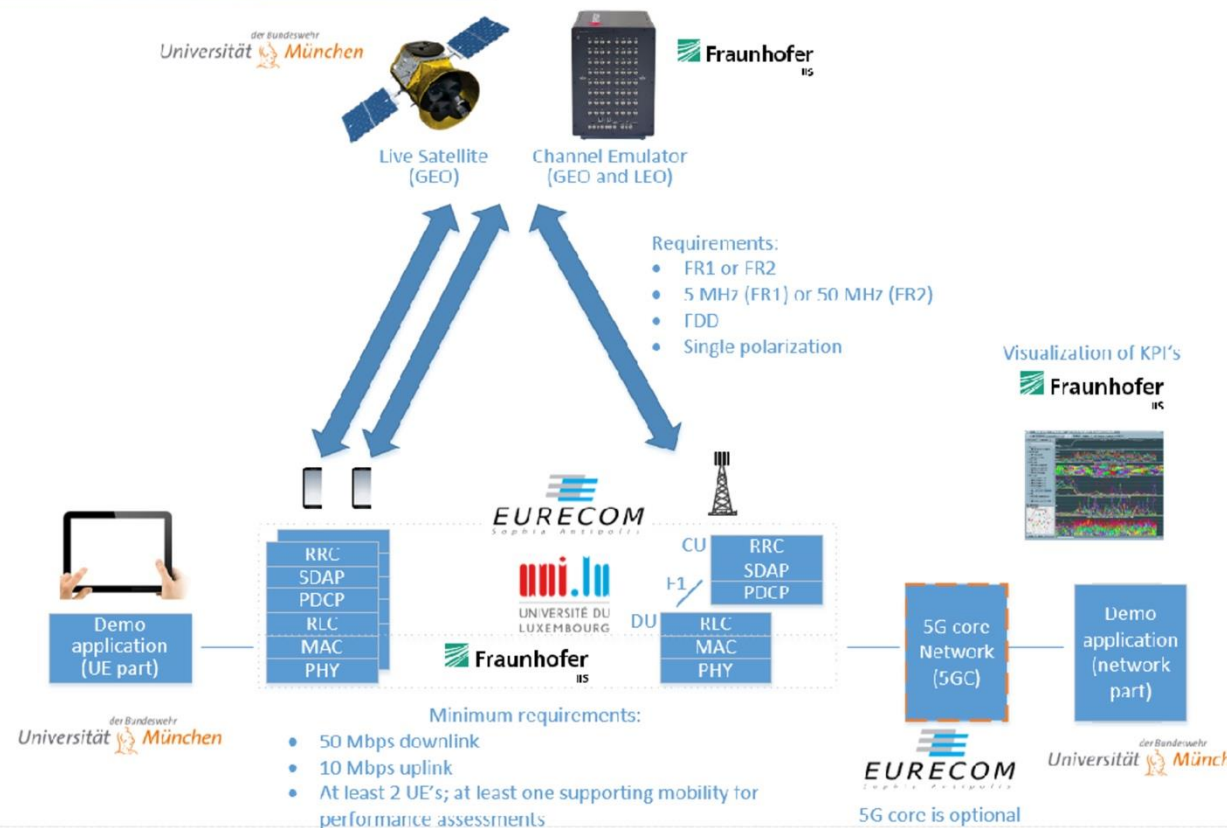
- ▶ Nvidia Aerial RAN, [Documentation](#)

Look-aside

- ▶ 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)

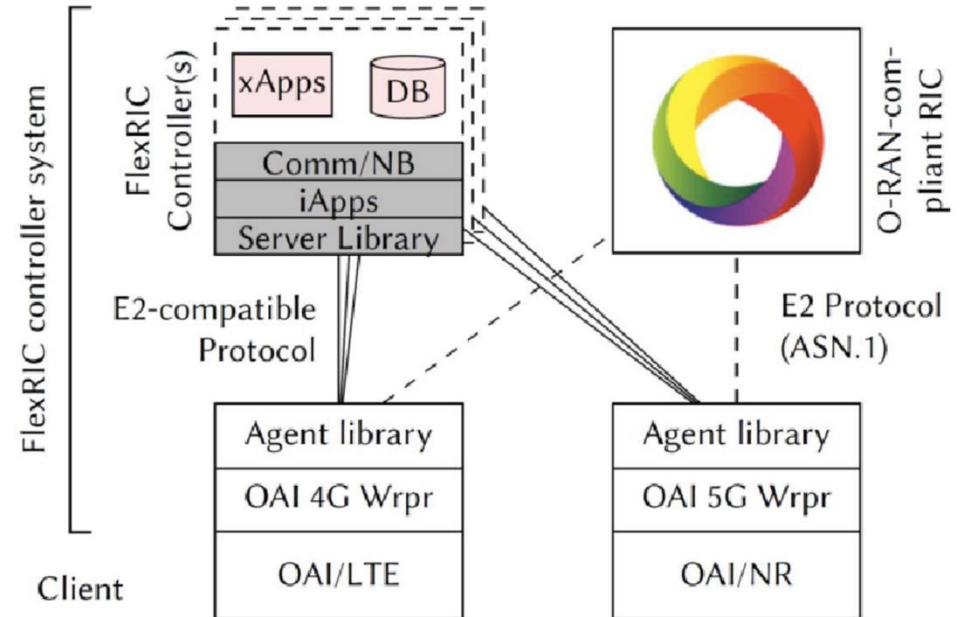


- ▶ Projects funded by ESA:
5G-GOA/5G-LEO/6G-LINO
- ▶ Forward data over relay GEO satellite, or emulator (LEO)
- ▶ Continuous freq. offset compensation, UL Timing
- ▶ SNR measurement, CSI Reporting
- ▶ AMC without HARQ feedback
- ▶ Handover



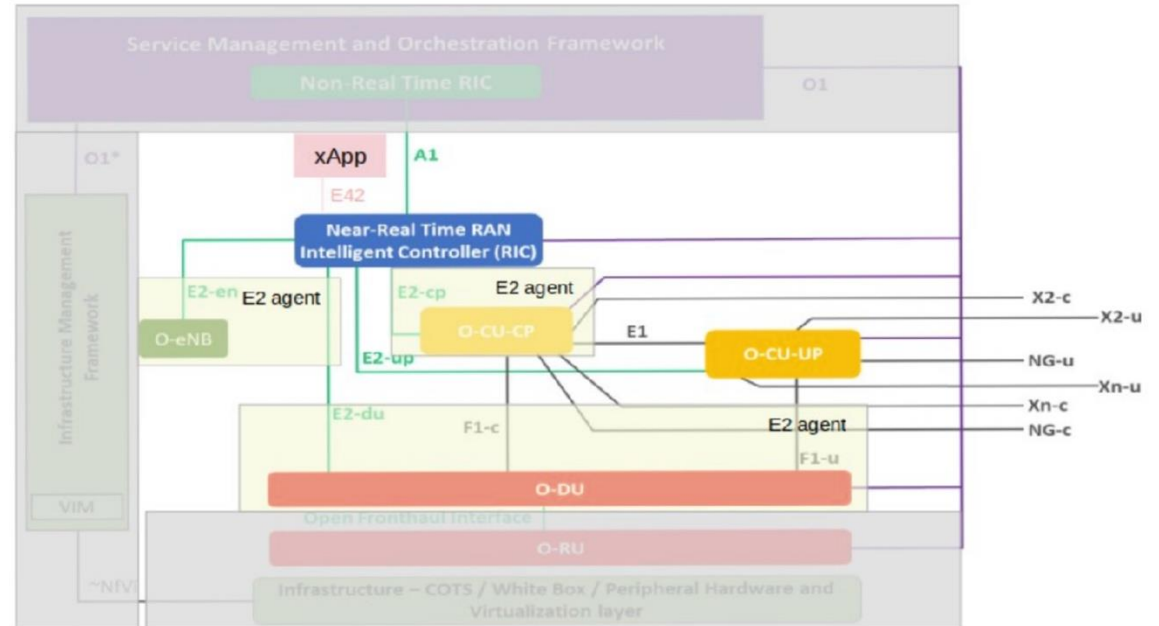
FlexRIC: Overview

- ▶ E2AP versions: v1.01/v2.03/v3.01
- ▶ List of supported Service Models:
 - ▶ **O-RAN**: E2SM-KPM (v2.01/v2.03/v3.00), and E2SM-RC (v1.03), E2SM-CCC (under integration)
 - ▶ **Custom**: E2SM-MAC, E2SM-RLC, E2SM-PDCP, E2SM-GTP, E2SM-TC, E2SM-SC, **E2SM-SRS (new)**
- ▶ Service Models need to be loaded in the nearRT-RIC, as well as in the E2 agent



FlexRIC: Deployment

- ▶ FlexRIC is an O-RAN compliant E2 agent, nearRT-RIC, and xApp SDK
- ▶ Container based deployment
 - ▶ Docker-compose
 - ▶ Helm-chart
- ▶ Support for multiple operating systems
 - ▶ RHEL
 - ▶ Ubuntu 22.04/24.04
 - ▶ Fedora



Upcoming subproject: 5GC

Basic

- ▶ 3GPP Rel. 16/17, Rel. 18 planned for Sem.1 2027
- ▶ Connection and registration procedures
- ▶ 500 UEs (Reg./Dereg.), <10s.
- ▶ Multiple PDU sessions/DNNs/slices per UE
- ▶ IPv4/v6/v4v6, Ethernet support

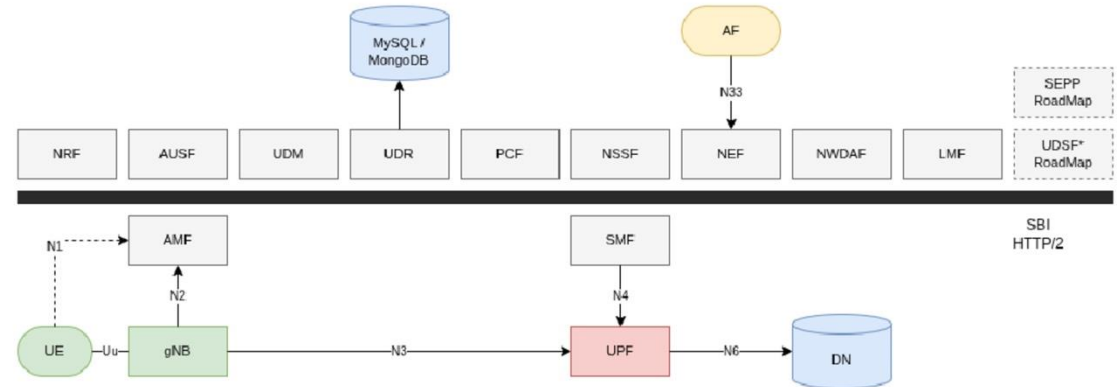
Additional Features

- ▶ QoS and policy
 - ▶ PCC rules from the PCF
 - ▶ Session AMP, per-flow MBR enforced
- ▶ Authentication via 5G-AKA, SUCI de-concealment (ECIES/A)
- ▶ N2 handover procedures
- ▶ Traffic steering: UL CL, redirection, steering
- ▶ Network slicing (NSSF, multiple AMFs)
- ▶ eBPF/XDP (kernel) or simple-switch (user)

Upcoming Project: 5GC deployment options

Modes of OAI 5G core

- ▶ **Minimalist**: AMF, SMF, UPF, NRF
- ▶ **Basic**: adds UDM, AUSF, UDR
- ▶ **Full**: PCF, NSSF, NEF
- ▶ UPF in two modes:
 - ▶ Simple switch
 - ▶ eBPF/XDP-based



Deployment Options

- ▶ Automated deployment of NFs in Docker/Podman containers
- ▶ Cloud-native using [Helm Charts](#) in Kubernetes/OpenShift

Duranta Project: What & Where

- ▶ Get it at <https://github.com/duranta-project/>
- ▶ Includes [tutorials](#) and [documentation](#) in subprojects
- ▶ All development happens here!
- ▶ We invite partners to our [Slack channel](#): <https://openairinterface.slack.com/>
- ▶ There are public [mailing lists](#) to ask user questions and get help from the community!
- ▶ A number of companies provide [ready-to-go setups](#) and [support](#).

Thank you!
Q? A!