Newsletter

OAI 2024 WINTER EDITION

As we wrap up yet another exciting year, we are pleased to share the OAI 2024 Winter Newsletter. This edition features updates on recent progress in the OAI RAN, Core Network, and OAM components, along with achievements and upcoming initiatives. Explore the latest developments driving innovation within the OAI community.

OAI 10th Anniversary Workshop

The OpenAirInterface Software Alliance celebrated its 10 anniversary workshop hosted by EURECOM, the founding member of OAI, on September 12 - 13, 2024, in Biot, France. Marking a decade of innovation, the OAI community has made significant strides in developing 4G and 5G software, benefiting tens of thousands of users worldwide. As a pioneer in open-source software-defined radio solutions, OAI has accelerated innovation and fostered collaboration with leading technology companies and research organizations. The workshop was not only an opportunity to reflect on past achievements but also to envision the challenges and opportunities that lie ahead. We extend our heartfelt thanks to all attendees, speakers, and partners for their invaluable contributions and for making this event successful. We look forward to building an even stronger and more vibrant OAI community in the future.

New Member

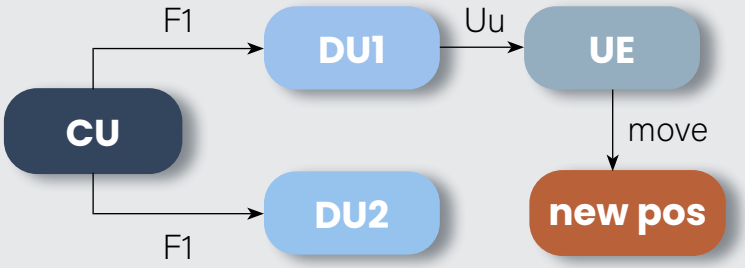
Strategic Member:

Red Hat

OAI RAN

Handover Over F1

In the second half of 2024, the work on the F1 handover was completed, and the feature was merged into OAI's main "develop" branch. It allows the handover of a UE between two adjacent DUs connected to the same CU over the 3GPP F1 interface. To this end, it is now possible to configure neighbor relationships of cells in the CU and to trigger handover between cells of different DUs either on demand or using measurement reports provided by UEs. Extensive testing with COTS UE in lab settings has been performed. Also, if radio equipment is not readily available, the OAI UE, connected to the gNB using the RFsimulator, allows the test of this feature in a fully virtualized manner. The use of the E1 interface is optional but possible. For more information, refer to the handover tutorial in the OAI repository.



OAI RAN New Release: v2.2.0

After nine months of hard work, the OAI RAN team proudly announces the release of the next major OAI RAN version, v2.2.0! This release is packed with new features across both the gNB and UE. Notably, the gNB now supports MIMO with up to four layers in DL, as well as handovers over the F1 interface. Additionally, various improvements have been made for O-RAN 7.2-compatible RUs, and support for L1 accelerators for in-line (Nvidia Aerial) and look-aside (AMD T2 Telco) configurations has been enhanced. Both the gNB and UE also experimentally support FR2 radio frequencies beyond 6 GHz, non-terrestrial networking (NTN) in the context of geostationary (GEO) satellites, and 2-step random access. Furthermore, numerous procedures have been reworked and implemented at the UE to achieve basic interoperability with COTS gNBs. Lastly, this release includes many bug fixes and updated documentation. Find the list of high-level changes in the release notes.

O-RAN FHI 7.2 Improvements and DL 4-layer MIMO

After integrating the O-RAN 7.2 fronthaul interface at the beginning of 2024, the OAI team continued to enhance this split option. Specifically, we improved the fronthaul interface driver to support additional bandwidths (tested: 40/60/80/100 MHz) and antenna configurations (tested: 1x1 up to 4x4). Since O-RUs are synchronized in a network due to the S-plane, they are also ideally suited to form distributed antenna arrays, combining multiple O-RUs to increase the antenna count. In our tests, we used two RUs in an 8x8 configuration. Each RU provides four receive and four transmit antennas. Additionally, we upgraded to the F release of xran, the O-RAN Software Community's library for implementing the 7.2 interface. This upgrade includes several bug fixes and facilitates the addition of the O-RAN 7.2 M-plane (see OAI OAM section). All of the above is documented in the O-RAN 7.2 split tutorial available in the repository, including instructions for interfacing with the METANOIA O-RU. Instructions for the Foxconn RPQN O-RU are planned for release early next year. In parallel, we are testing the recently finalized DL 4-layer MIMO capabilities on 100 MHz bandwidth with several O-RUs. Currently, the OAI RAN stack supports up to 1 Gbps in the downlink, and we are actively working to further improve downlink throughput.

OAI CORE NETWORK

OAI UPF (eBPF) Achieves Nearly 100 Gbps Throughput

We are excited to announce a significant milestone for the OAI UPF based on eBPF/XDP. Tests conducted using the TRex traffic generator have demonstrated that the OAI UPF (eBPF) can achieve nearly 100 gigabits per second throughput. This achievement marks an important step in supporting advanced 5G and 6G use cases. It underscores OAI's commitment to pushing the boundaries of open-source telecom solutions and delivering cutting-edge performance.

Improve the Code Quality of 5G CN to Make it Stable and Robust

As the number of supported network functions (NFs) and features increases, with OAI CN now encompassing 11 network functions, maintaining and improving code quality has become one of the most important tasks of the OAI CN project. We continue to enhance code quality to make it more stable and robust by first relying on common sub-modules to simplify the codebase, then regularly refactoring the code, and finally introducing unit tests in all libraries. Optimizing and simplifying the OAI CN codebase is particularly important in the context of 5G Advanced and 6G, for example, to add new procedures, features, and NFs to support new 6G RAT(s) and use cases. We are also actively addressing bugs reported by end users to make OAI CN more stable and compatible with a wider range of COTS UEs.

OAI OAM

Orange Integrates Northeastern's ns-O-RAN with FlexRIC

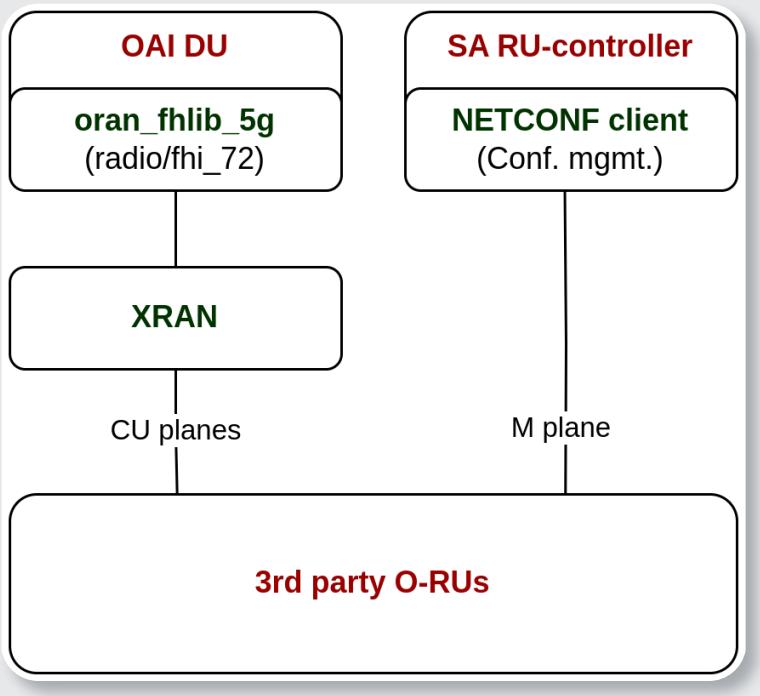
We are excited to highlight ns-O-RAN, the first open-source simulation platform that seamlessly integrates a functional 4G/5G protocol stack in ns-3 with an O-RAN-compliant E2 interface. Originally developed by Northeastern University, ns-O-RAN is designed to bridge the gap between O-RAN software, such as the O-RAN Software Community's Near-RT RIC, and large-scale 5G simulations based on 3GPP channel models and detailed 3GPP RAN protocol stack modeling. This enables O-RAN-compliant Key Performance Measurements (KPMs) collection and advanced use cases such as Traffic Steering (TS) and more. Recently, Orange Innovation Egypt has further enhanced the ns-O-RAN platform. It includes extending its interoperability to support FlexRIC, the OAI Near-RT RIC, forming the foundation of the RIC Testing as a Platform (RIC-TaaP) framework. We are proud to announce the successful integration of ns-O-RAN with FlexRIC. This collaboration establishes a foundation for advanced Energy Efficiency (EE) and Traffic Steering (TS) testing while complementing the existing suite of FlexRIC xApps. The ns-O-RAN-FlexRIC integration supports E2AP v1.01, KPM v3.00, and RC v1.03, reinforcing its capabilities to drive innovation in RAN testing and optimization. In addition, Orange Innovation Egypt has developed a new Handover xApp to support EE implementation via mobility management. This innovative xApp includes advanced control actions, such as handover and conditional handover, that run smoothly on FlexRIC. Currently in testing, the Handover xApp will soon be available for community use. We thank Orange Innovation Egypt for this initiative and look forward to their continued contributions. Their efforts to expand the capabilities of the platform promise further advancements for the O-RAN ecosystem.

Management Plane integration in OAI 7.2 split

As we continue to enhance our fronthaul integration, one of our key focuses is the Management Plane, specifically Configuration Management between the OAI DU and commercial O-RUs.

(1) As an initial step, we've deployed a standalone RU-controller that connects to RUs, retrieves their capabilities (such as RF capabilities, compression methods, and interfaces), subscribes to PTP synchronization state change, and configures the CU-planes. The first proof of concept was completed with the VVDN O-RU.

(2) We are advancing the integration of this M-plane within the nr-softmodem and will keep the community updated on our progress and milestones.



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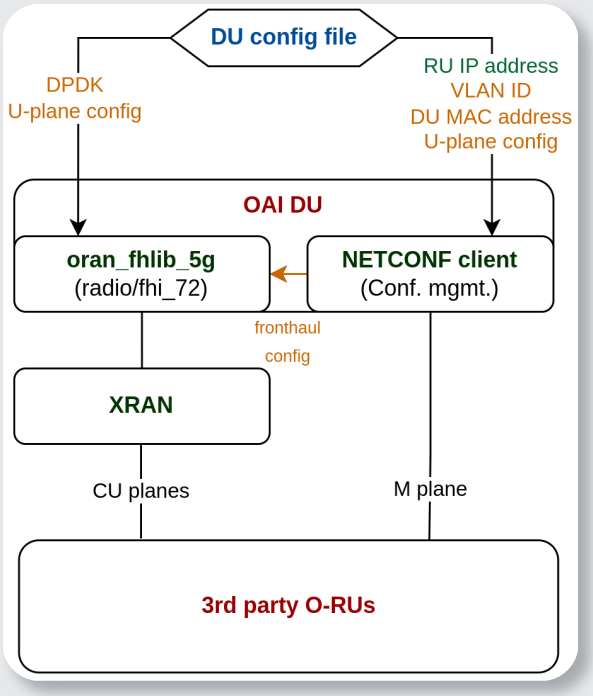

(2)

OAI EVENTS

OAI at Ubuntu Summit:

At this year's Ubuntu Summit event, which took place in The Hague, Netherlands, Canonical demonstrated an end-to-end 5G network running Open RAN Central Unit and Distributed Unit radio stack software distributed by OpenAirInterface. Canonical's Telco Engineering team has been working on bringing automation in software lifecycle management to OAI's CU and DU, which makes it possible to deploy and manage open-source Open RAN as a cloud-native radio stack on Kubernetes. Using Canonical's Juju software orchestration engine, Charmed OAI RAN brings simplicity to operating OAI's open-source radio stack. The demo at the Ubuntu Summit event showcased integration with Charmed Aether SD-Core, an open-source 5G core network product from Canonical, which is currently in its beta release. Event participants had the opportunity to test the system with commercial phones and learned more about OAI's radio stack and Canonical's open-source solutions for private mobile networks.

Mobile World Congress (MWC) Las Vegas 2024

In October, OAI presented a virtual demo entitled "Building an O-RAN Continuous Testing Reference Platform." With this demo, OAI demonstrated that continuous testing improves the quality and stability of the software stack. In our recent efforts, we have built an internal continuous testing platform to evaluate all the latest changes introduced in the OpenAirInterface software stack, including RAN, Core, and RIC. In this demo, we showcased one of the test scenarios: the end-to-end deployment of the OAI 5G network, highlighting the RAN KPIs exposed via an xApp connected to the OAI Near-RT RIC. In this scenario, we used the Benetel 650 n78 O-RU, with a 40 MHz bandwidth, multi-pattern TDD configuration (DDDSUUDDDD), and a 4x4 antenna configuration (2-layer Downlink and 1-layer Uplink). The OAI-DU is deployed on a Red Hat Single Node OpenShift cluster (edge), while the OAI Core Network, CU-CP, CU-UP, OAI-RIC, and xApps run on a central Red Hat OpenShift cluster. The xApps' KPIs are displayed on the Grafana dashboard. The two clusters and all the network functions are deployed and managed using Red Hat Advanced Cluster Management (ACM) and Argo CD.

2024 Fall Global O-RAN PlugFest

In November, OpenAirInterface actively participated in multiple PlugFest venues, including EURECOM and OTIC Paris, showcasing innovative advancements in Open RAN technologies.
At EURECOM, OAI demonstrated the integration of the OAI Distributed Unit (DU) with the Metanoia Jura 5G Sub-6GHz O-RU Reference Platform, achieving end-to-end connectivity using Quectel commercial off-the-shelf (COTS) User Equipment (UE) and the OAI Core Network. The setup was linked to OAI's Jenkins instance, emphasizing automated end-to-end testing within a Continuous Integration (CI) environment. At OTIC Paris, OAI deployed a containerized Open RAN 5G Standalone (SA) network, including both Core and RAN components managed by the Sylva Telco Cloud stack. Using a LiteOn O-RU, the team conducted end-to-end performance tests with COTS UE, demonstrating the flexibility and efficiency of OpenAirInterface in Telco Cloud environments.

OAI at the ETSI SNS4SNS Workshop

The OpenAirInterface Software Alliance recently participated in the ETSI SNS4SNS Workshop held from 12-14 November, where a talk and a demo were presented. Jérôme Härri delivered a talk titled "OpenAirInterface Software Alliance (OSA) - Open-Source, Standard & Industry Compliant Software Assets for Next-Generation Smart Networks & Services," showcasing the evolution of the OAI platform over the past two decades and its mission to democratize R&D for future cellular systems. He highlighted the OSA ecosystem, its industry-friendly open-source license, and the strategic roadmap for the 5G RAN, Core Network, and OAM components while also discussing OSA's collaborations with standard development organizations such as ETSI, 3GPP, and IETF, as well as contributions to initiatives like O-RAN and large-scale infrastructures under the EU's SLICES-RI program. Giulio Carota presented the demo "CAPIF Integration with OAI Network Exposure Function," demonstrating OSA's advancements in network programmability and API exposure capabilities.

OpenAirInterface Foundation Launched to Foster the North American OAI Open RAN community

The OpenAirInterface Foundation proudly announces its incorporation in the United States. This milestone supports the creation of a self-sustaining open-source Open RAN ecosystem in the U.S. while contributing to workforce education and training through OAI software. Encouraged by U.S.-based academic, industrial, and government partners, the Foundation addresses the growing demand for open-source cellular network solutions, particularly in Open RAN. By establishing a dedicated U.S.-based engineering team, the Foundation aims to engage with local stakeholders, support Open RAN use cases, and foster a self-reinforcing community. As a leader in open-source wireless software, OpenAirInterface provides an essential platform for 5G prototyping, deployment, and workforce training. The U.S. Foundation will play a strategic role in advancing these efforts alongside government, academic, and industry partners.