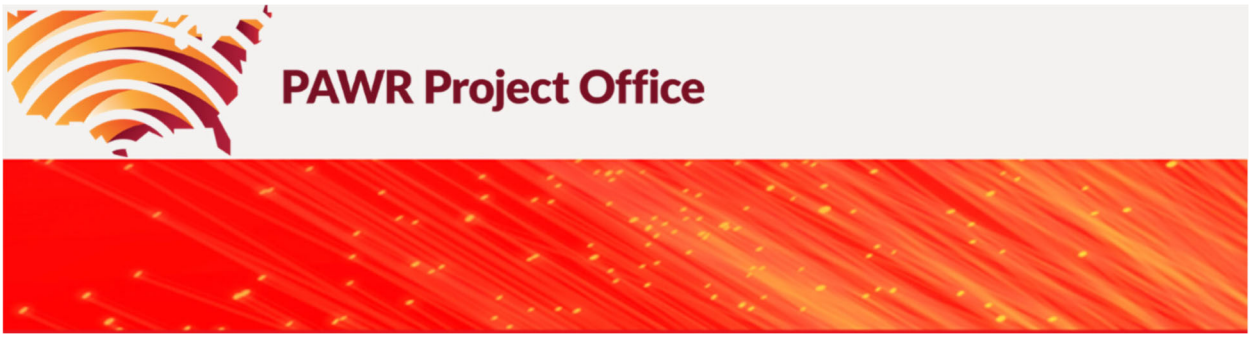


October 2023

Welcome to the monthly PAWR update. Each month we deliver technical updates on: POWDER, COSMOS, AERPAW, ARA, and Colosseum.

POWDER

In keeping with the mission to offer programmable network and Open RAN resources for research and testing, the POWDER team has acquired a batch of commercial-off-the-shelf (COTS) radio units that can be paired with open source software in the core and the CU/DU. These COTS radios offer more stability and robustness than a research-grade software defined radio, but still provide significant flexibility for programming the network by interfacing with software-based functions in the CU and DU that historically would have been locked down in dedicated base station hardware.

POWDER is testing the COTS RUs with open source srsRAN CU/DU software and Open5GS software for the mobile core.

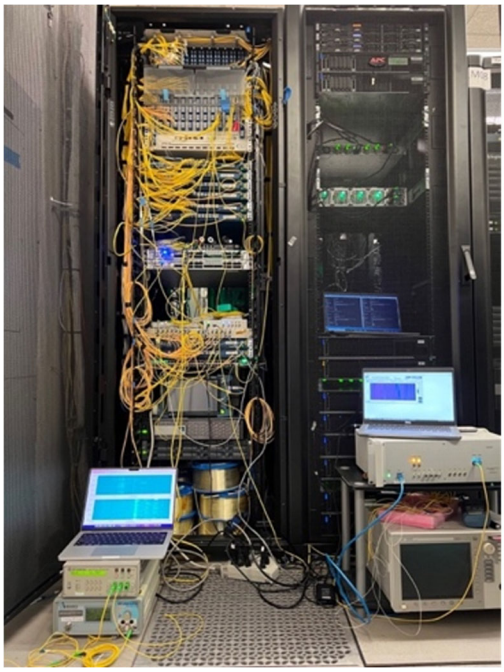
David Johnson on the POWDER team will present on POWDER's O-RAN capabilities with open source software stacks at the upcoming srsRAN Project Fall Workshop 2023 hosted by SRS in partnership with the Commonwealth Cyber Initiative (CCI) in Arlington, Virginia.

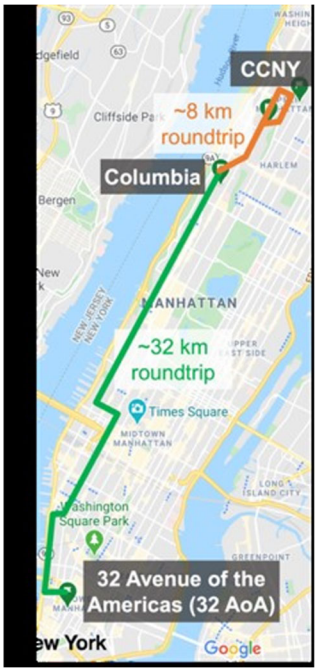
COSMOS

The COSMOS team announced a significant milestone this month in a joint demonstration that used an Open Transponder Whitebox architecture for the connection between a data center and a mobile network. Partners included NEC Corporation, NEC Laboratories America, Columbia University, Duke University, and the SFI CONNECT centre at Trinity College Dublin.

The COSMOS/NEC field trial used a coherent 400GbE transponder embedded in Telecom Infra Project's (TIP's) Galileo Flex-T whitebox platform and integrated with data center compute servers and switches, reconfigurable optical add-drop multiplexer (ROADM) units and optical switches, as well as software-defined radios (SDRs). The system also integrated NEC's distributed acoustic sensing (DAS) interrogator capable of traffic detection and monitoring using field-deployed fibers. The open architecture is designed to enable disaggregation of networking equipment and the integration of equipment from different vendors.

The demonstration took place over a multi-node network connection including two sites in the COSMOS testbed at Columbia University and the City College of New York, and a third at 32 Avenue of the Americas (32AoA). It used fiber provided by Crown Castle (a PAWR industry consortium partner) and Boldyn Networks.

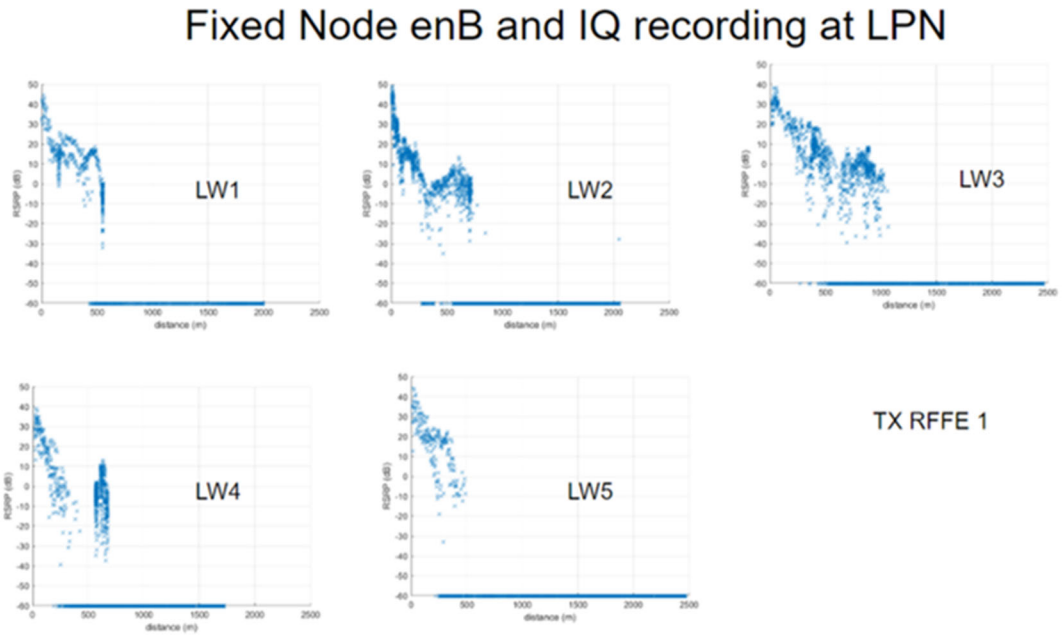




Research results from the demonstration were published in a paper that was selected as a “Top-Scored Paper” at OFC’23. An extended version with additional results will appear in IEEE/Optica Journal of Lightwave Technology, Special Issue of Top-Scored Papers from IEEE/Optica OFC’23.

AERPAW

In advance of the launch of its extended testbed footprint, AERPAW this month carried out a long flight experiment with one of its large drones around five towers at Lake Wheeler using srsRAN LTE open source radio software. The team collected IQ data at each of the five towers in two different network configurations. In the first configuration, the drone acted as a flying eNodeB with the towers acting as UEs. In the second configuration, the roles were reversed, and the towers were used simultaneously as eNodeBs with the drone acting as a UE.



ARA

Following just after the successful launch of the ARA platform, the ARA team won recognition at WiNTECH 2023 with the Best Paper Award for their Skylark radio deployment. The paper details the first-of-its-kind TV White Space (TVWS) many-antenna MIMO (mMIMO) architecture available at ARA. Using the Skylark Faros V2 in a field-deployed multi-user MIMO (MU-MIMO) system, the architecture leverages TV White Spaces spectrum to provide high-capacity connectivity over large geographical areas of a radius up to 10 km. The Skylark radios at ARA also include rich APIs to monitor and control the behavior of the production-grade mMIMO system.

The ARA team continues to grow. ARA recently welcomed Dr. Mohammed Soliman, who joined the platform as manager of Research and Engineering. He comes to ARA from Rakuten and brings commercial operator expertise to the project.

Colosseum

Stay tuned for updates from Colosseum next month.

Since its relaunch at Northeastern University in October 2020, the Colosseum RF emulator has attracted 85 teams and well over 400 users. Software available through Colosseum includes open source software stacks for 4G and 5G, code for one of the original competition radios in DARPA's Spectrum Collaboration Challenge, and the new OpenRAN Gym, which is an open toolbox for data collection and experimentation with AI in O-RAN.