Integration with 3rd party L1, NVIDIA Aerial
NVIDIA Aerial SDK

NVIDIA Aerial provides inline layer 1 offloading on COTS hardware
➢ A100 GPU for signal processing acceleration
➢ Melanox CX6-DX NIC for fronthaul
Interfaces with L2 Using SCF222.10.02 FAPI standard
Interfaces with commercial O-RU radios using O-RAN 7.2
Nvidia gives access to source code (but not classical open source)

https://developer.nvidia.com/aerial-sdk
https://docs.nvidia.com/aerial/aerial-research-cloud/index.html
NVIDIA Aerial SDK

- Complete inline L1 acceleration
- No fixed function HW accelerators
- C/C++ programmable L1
- O-RAN 7.2x split

- O-RAN 7.2x FH Interface with eCPRI
- SyncE, G.8273.2 Slave/GM Clock
- Quectel UE

NVIDIA GPU

COTS Server

Radio Unit (O-RU)

Centralized Unit (O-CU)

Distributed Unit (O-DU)

OAI-NVIDIA gNB (CU+DU+CN)

OAI Core Network

Backhaul

Fronthaul

NVIDIA NIC

O-RU

FH IF

SyncE, G.8273.2 Slave/GM Clock

Quectel UE
Integration of Aerial with OpenAirInterface

Nvidia Aerial is used as an inline L1 accelerator DU-high (Layer 2) from OpenAirInterface Interface realized using 5G FAPI defined by Small Cell Forum Both run in individual docker containers Traces can be analyzed with Wireshark

DU Layer 1 southbound interface: O-RAN 7.2 DU Layer 2 northbound interface: 3GPP F1 DU can be combined with CU in a single executable/container

Inline GPU acceleration of the entire L1 improves performance and extends features of OAI DU to multiple cell deployments and other advanced configurations
Aerial Research Cloud Setup

COTS Server

5GC
- SMF
- UPF
- AMF

CU
- SDAP/PDCP
- RRC/PDCP
- MAC/RLC

DU-high
- SCF 5G FAPI

DU-low
- PHY

A100 GPU + CX6-DX NIC

Fronthaul switch

PTP
grandmaster with GPS

O-RU

COTS UE

COTS Server

5GC

O-RAN 7.2

MAC/RLC

PHY

SDAP/PDCP

RRC/PDCP

SCF 5G FAPI

Cu

DU-high

DU-low

COTS Server