# Configure and Run a 5G end-to-end setup with OAI CN5G and OAI gNB

## OAI CN5G

### *OAI CN5G pre-requisites*

- sudo apt install -y git net-tools putty

- sudo apt install -y apt-transport-https ca-certificates curl software-properties-common
- curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -
- sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable"
- sudo apt update
- sudo apt install -y docker docker-ce

  # Add your username to the docker group, otherwise you will have to run in sudo mode.
- sudo usermod -a -G docker $(whoami)
- reboot

### *OAI CN5G configuration files*

- wget -O ~/oai-cn5g.zip https://gitlab.eurecom.fr/oai/openairinterface5g/-/archive/develop/openairinterface5g-develop.zip?path=doc/tutorial_resources/oai-cn5g
- unzip ~/oai-cn5g.zip
- mv ~/openairinterface5g-develop-doc-tutorial_resources-oai-cn5g/doc/tutorial_resources/oai-cn5g ~/oai-cn5g
- rm -r ~/openairinterface5g-develop-doc-tutorial_resources-oai-cn5g ~/oai-cn5g.zip

### *Pull OAI CN5G docker images*

- docker pull mysql:8.0
- docker pull oaisoftwarealliance/oai-amf:develop
- docker pull oaisoftwarealliance/oai-nrf:develop
- docker pull oaisoftwarealliance/oai-smf:develop
- docker pull oaisoftwarealliance/oai-udr:develop
- docker pull oaisoftwarealliance/oai-udm:develop
- docker pull oaisoftwarealliance/oai-ausf:develop
- docker pull oaisoftwarealliance/oai-spgwu-tiny:develop
- docker pull oaisoftwarealliance/trf-gen-cn5g:latest
- docker build --target ims --tag asterisk-ims:latest --file ~/oai-cn5g/Dockerfile .

### *Start OAI CN5G*

- cd ~/oai-cn5g
- docker compose up -d

### *Stop OAI CN5G*

- cd ~/oai-cn5g
- docker compose up -d

### *Show CN5G Logs*

- docker logs -f oai-amf

# OAI gNB and OAI nrUE

## *Build UHD from source*

- sudo apt install -y libboost-all-dev libusb-1.0-0-dev doxygen python3-docutils python3-mako python3-numpy python3-requests python3-ruamel.yaml python3-setuptools cmake build-essential

- git clone https://github.com/EttusResearch/uhd.git ~/uhd
- cd ~/uhd
- git checkout v4.4.0.0
- cd host
- mkdir build
- cd build
- cmake ../
- make -j $(nproc)
- make test # This step is optional
- sudo make install
- sudo ldconfig
- sudo uhd_images_downloader

## *Build OAI gNB and OAI nrUE*

**# Get openairinterface5g source code**

- git clone https://gitlab.eurecom.fr/oai/openairinterface5g.git ~/openairinterface5g
- cd ~/openairinterface5g
- git checkout develop

**# Install OAI dependencies**

- cd ~/openairinterface5g/cmake_targets
- ./build_oai -I

**# nrscope dependencies**

- sudo apt install -y libforms-dev libforms-bin

**# Build OAI gNB**

- cd ~/openairinterface5g
- source oaienv
- cd cmake_targets
- ./build_oai -w USRP --ninja --nrUE --gNB --build-lib "nrscope" -c

# Testing OAI nrUE with RFsimulator

## *Run OAI gNB with RFsimulator*

- cd ~/openairinterface5g
- source oaienv
- cd cmake_targets/ran_build/build
- sudo ./nr-softmodem -O ../../../targets/PROJECTS/GENERIC-NR-5GC/CONF/gnb.sa.band78.fr1.106PRB.usrpb210.conf --gNBs.[0].min_rxtxtime 6 --rfsim –sa

## *Run OAI nrUE with RFsimulator*

- cd ~/openairinterface5g
- source oaienv
- cd cmake_targets/ran_build/build
- sudo RFSIMULATOR=127.0.0.1 ./nr-uesoftmodem -r 106 --numerology 1 --band 78 -C 3619200000 --nokrnmod --rfsim --sa --uicc0.imsi 001010000000001

# Testing OAI nrUE with USRP B210

## *Run OAI gNB with USRP B210*

- cd ~/openairinterface5g
- source oaienv
- cd cmake_targets/ran_build/build
- sudo ./nr-softmodem -O ../../../targets/PROJECTS/GENERIC-NR-5GC/CONF/gnb.sa.band78.fr1.106PRB.usrpb210.conf --gNBs.[0].min_rxtxtime 6 --sa -E –continuous-tx

## *Run OAI nrUE with USRP B210*

- cd ~/openairinterface5g
- source oaienv
- cd cmake_targets/ran_build/build
- sudo ./nr-uesoftmodem -r 106 --numerology 1 --band 78 -C 3619200000 --nokrnmod --ue-fo-compensation --sa -E --uicc0.imsi 001010000000001