4G/5G Labkit

Quick Start Guide

Firecell **Labkit** is a simple and ready-to-use solution providing private and customized 4G/5G networks with COTS UE. This document outlines the different steps to easily connect all the hardware components, including:

- 1 server machine
- 1 or 2 B210 or equivalent USRPs
- 2 or 4 Antennas
- 1 or 2 USB 3.0 cable
- 1 SIM card
- 1 Power cable

1) Physical setup

Setting up the server

Step 1 - Plug one end of the power cord into back of the server and the other end into a power outlet or surge protector

Step 2 - Connect the ethernet cable to the server's Ethernet port.

Step 3 - Connect the other end of the ethernet cable to a hub or other network access device

Step 4 - Connect the server to a monitor via HDMI cable

Step 5 - Connect a keyboard and mouse to the server to configure it

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Setting up the SDR

Step 1 - Connect one antenna to TX/RX A connector

Step 2 - Connect the other antenna to RX2 A connector

→ Long antennas can only be used for LTE by connecting them to eNB's USRP for 4G or 5G NSA use case

→ Short antennas can be used either for LTE by connecting them to the eNB's USRP or for 5G by connecting them to the gNB's USRP for the use case of 5G NSA or 5G SA

Step 3 - Plug one end of the USB3.0 cable into the USRP and the other end to the server's 3.0 USB port

→ Throughout this document, USRP B210 is used as the default RF radio access point for eNB and gNB.

User can now turn on the machine. The default user credentials for the server:

```
Username: Firecell
Password: 123456
```

The server is running on UBUNTU 20.04. It provides all the required software components and tools required to deploy and validate the system including:

- OAI EPC
- OAI 5GCN
- OAI RAN (eNodeB and gNodeB)
- USRP Hardware drivers (UHD)
- Scrcpy (remote access to Android UE)

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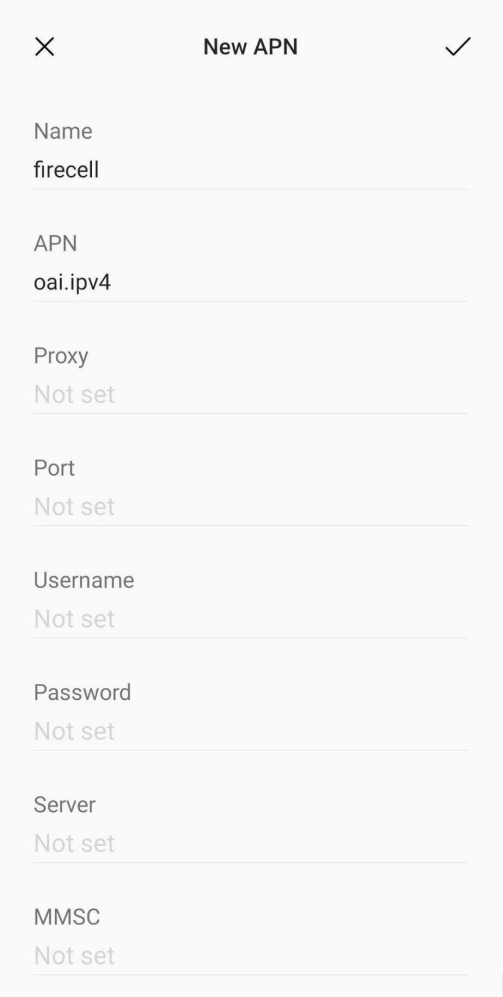
→ The machine can be accessed through ssh session or by connecting it to a monitor, using HDMI cable, keyboard and mouse

2) Android UE setup for 4G/5G NSA

Insert the SIM card in the mobile Phone in order to create a new APN profile

- ➔ Go to mobile settings
- ➔ Select “Mobile network”
- ➔ Select “Access point names”
- ➔ Create a new access point using “+“ icon
- ➔ Give a name to this new access point, as instance ''Firecell''
- ➔ Set the APN field as “oai.ipv4“
- ➔ Set the Bearer field as “LTE” for 4G and “NR” for 5G NSA
- ➔ Check the MCC and MNC values as configured in the SIM card



4G connection is tested with the following android UEs:

- Samsung Galaxy A42 5G
- OPPO find X3 Lite
- Huawei mate 30 Pro
- Google Pixel 5
- One Plus 8

✔ 5G NSA connection is successfully tested with the phone “One Plus 8” as a UE

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