firecell

Labkit v3

OPEN SOURCE 4G / 5G NETWORK

FOR DEVELOPMENT AND TESTS

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Firecell Labkit v3

Firecell Labkit is a lightweight open source 4G / 5G network, packaged in a compact kit with a smartphone and SIM card, for development and tests

Fit for all use cases

Firecell Labkit is a perfect fit for enterprises, R&D labs and universities who want to demonstrate and innovate using a real cellular network in their premises:

- Build and run Proof of Concepts and demos of your device or apps using 4G or 5G.
- Test your robots, AGVs, industrial routers, connected cameras, smart tools, barcode readers and other devices with your own small private 5G in your lab
- Kick start your research with a fully functional 5G setup, fine tune any part of the protocol.
- Develop enhancements of 5G security by inspecting the code and the protocols
- Train your team on 5G by letting them inspect how an actual cellular network works

Simply open

Firecell Labkit is the only commercial cellular network solution provided as open source and supporting Open RAN.

Based on the **OpenAirInterface (OAI)** Core network and Radio Access Network (RAN) software, backed by over 200 industry and academic members, including Qualcomm, Fujitsu, Orange and Meta. With **Firecell Labkit**, you can develop and test your own products, algorithms, modules and applications. If you want to contribute back to the OAI community, we will help you with the process.

Support from experts

Firecell Labkit comes with online access to Firecell's source code, documentation and a support page dedicated to you, where you can raise all your questions and issues.

With Firecell's **Gold** Support, you will be guided through the configuration and operation of your cellular network with the provided smartphone and SIM card.

If your objective is to integrate with third party software, additional devices, or develop your own code, then Firecell's **Platinum** Support will help you reach your goal thanks to our team of experts.

Quarterly releases

Firecell maintains stable releases of the OpenAirInterface source code. New software releases are published 4 times a year. They contain features, enhancements and bug corrections from OAI. You can upgrade your software version from Firecell's repository with a simple command.

As long as you subscribe to Firecell's Support & Maintenance, you get access to Firecell's latest software release.

What you get

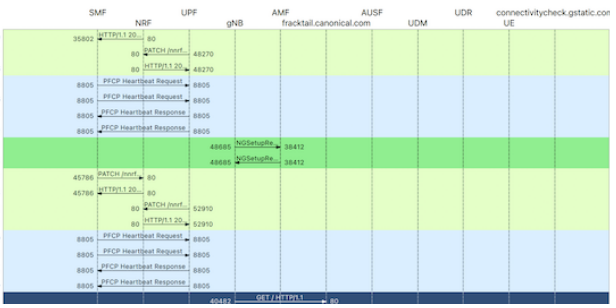
Firecell Labkit is composed of :

- a PC pre-installed with a 4G and 5G Core, a eNodeB, a gNodeB, NMS, and Wireshark software
- a rugged 4G / 5G smartphone
- a pre-configured SIM card.

What you can do

Firecell Labkit is pre-installed, pre-tested, pre-configured and ready to use: get your own end-to-end 4G or 5G cellular network on air in less than 15 mn.

- Deploy and update a cellular network easily using Firecell's command line scripts.
- Configure the central frequency band, bandwidth, modulation and coding scheme, attenuation.
- View the protocol messages between network elements with Wireshark.
- Inspect extensive log files and view the detailed list of network events.
- Modify and recompile the source code.



Labkit flavours

Labkit comes in 4 flavours :

- **Labkit 40** : supports 4G up to 20 MHz and 5G Standalone (SA) up to 40 MHz in all frequency bands under 6 GHz.
- **Labkit 40 NSA** : same as Labkit 40, but with an additional radio to support 5G Non-Standalone (NSA).

- **Labkit 100** : supports 4G up to 20 MHz and 5G SA up to 100 MHz in 2x2 MIMO, in all frequency bands under 6 GHz.

- **Labkit O-RAN** supports 5G SA, F1 Split 2 interface between O-CU and O-DU, Open-FH Split 7.2 interface between O-DU and O-RU, CUS (Control, User and Synchronisation) planes, PTP synchronisation. Comes with a dedicated NIC, GPS antenna, Open RAN radio unit (O-RU) available in the following frequency bands : **n77**, **n48** and **n78**.

Labkit model	Capability	Max 5G Bandwidth	Frequency Band	Coverage
Labkit 40	4G, 5G SA	40 MHz SISO	70 MHz - 6 GHz	3-5 metres
Labkit 40 NSA	4G, 5G SA, 5G NSA	40 MHz SISO	70 MHz - 6 GHz	3-5 metres
Labkit 100	4G, 5G SA	100 MHz MIMO 2X2	10 MHz - 6 GHz	5-10 metres
Labkit O-RAN n48	5G SA	100 MHz MIMO 2X2	3.55-3.7 GHz	30-100 metres
Labkit O-RAN n77	5G SA	100 MHz MIMO 2X2	3.8-4.2 GHz	30-100 metres
Labkit O-RAN n78	5G SA	100 MHz MIMO 2X2	3.6-3.8 GHz	30-100 metres

Pricing

Labkit model	Price, including worldwide delivery
Labkit 40	$ 13,200
Labkit 40 NSA	$ 15,900
Labkit 100	$ 27,500
Labkit O-RAN n48 / n77 / n78	$ 22,000

Support & Maintenance	Gold	Platinum
Price (mandatory the first year)	$6,180 / year	$10,880 / year
Access to Firecell Open Source code	✔	✔
Access to quarterly Firecell software releases	✔	✔
Support for Labkit configuration and operation	✔	✔
Support for integration with 3rd party software or device		✔
Support for source code modification & extension		✔

Invoicing and Payment Terms

Invoicing Terms
- 100% invoice at order

Payment Terms
- 30 days net from date of invoice

Delivery and Warranty

Delivery Duty Paid (DDP) worldwide
- 4-8 weeks (Labkit 40)
- 8-12 weeks (Labkit 100 / Labkit O-RAN)

Warranty
- 1 year warranty from reception date

Technical Specifications

Hardware

PC for Labkit 40	
Dimensions H × W × D / weight	430 mm × 200 mm × 377 mm / 6.8 kg
CPU	Intel Core i9-12900K (3.2 GHz / 5.2 GHz)
RAM	32 GB
Storage	SSD 500 GB
Network connectivity	1 x 2.5 GbE, Wifi 6
USB	2 x USB 2.0 ports (Type-A), 1 x USB 3.2 Gen 2 port (Type-A), 1 x USB 3.2 Gen 2x2 (Type-C), 2 x USB 3.2 Gen 1 (Type-A)
Power supply voltage input	100 - 240V AC
Operating system	Linux Ubuntu 20.04 LTS with 5.4.0-126-lowlatency kernel

PC for Labkit 100	
Dimensions H × W × D / weight	430 mm × 200 mm × 377 mm / 6.8 kg
CPU	Intel Core i9-12900K (3.2 GHz / 5.2 GHz)
RAM	32 GB
Storage	SSD 500 GB
Network connectivity	1 x 2.5 GbE, Wifi 6 Intel-based NIC 710 with 2x 10GbE SFP+
USB	2 x USB 2.0 ports (Type-A), 1 x USB 3.2 Gen 2 port (Type-A), 1 x USB 3.2 Gen 2x2 (Type-C), 2 x USB 3.2 Gen 1 (Type-A)
Power supply voltage input	100 - 240V AC
Operating system	Linux Ubuntu 20.04 LTS with 5.4.0-126-lowlatency kernel

PC for Labkit O-RAN n48 / n77 / n78	
Dimensions H × W × D / weight	430 mm × 200 mm × 377 mm / 6.8 kg
CPU	Intel Core i9-12900K (3.2 GHz / 5.2 GHz)
RAM	32 GB
Storage	SSD 500 GB
Network connectivity	1 x 2.5 GbE, Wifi 6 Intel NIC 810-XXVDA4 with 4 x 25GbE SFP28
USB	2 x USB 2.0 ports (Type-A), 1 x USB 3.2 Gen 2 port (Type-A), 1 x USB 3.2 Gen 2x2 (Type-C), 2 x USB 3.2 Gen 1 (Type-A)
Power supply voltage input	100 - 240V AC
Operating system	Linux Ubuntu 20.04 LTS with 5.4.0-126-lowlatency kernel
Synchronisation	PTP
Antennas	GPS antenna

Software Defined Radio for Labkit 40	
Dimensions H × W × D / weight	15 mm x 97 mm x 155 mm / 350 g
Frequency bands	70 MHz to 6.0 GHz
Bandwidth	Up to 56 MHz in 1x1 SISO, Up to 30.72 MHz 2x2 MIMO
Max output power	10 dBM (10 mW)
Antennas	2 x omnidirectional antennas : 617-960 MHz, 2496-2690 MHz, 3300-5000 MHz

Software Defined Radio for Labkit 100	
Dimensions H × W × D / weight	357.1 mm x 211.1 mm x 43.7 mm / 2,78 kg
Frequency bands	10 MHz to 6.0 GHz
Bandwidth	Up to 100 MHz per channel in 1x1 SISO and 2x2 MIMO
Max output power	18 dBM (63 mW)
Antennas	4 x omnidirectional antennas : 617-960 MHz, 2496-2690 MHz, 3300-5000 MHz

Open-RAN Radio for Labkit O-RAN n48 / n77 / n78	
Dimensions H × W × D / weight	209 mm x 186 mm x 62 mm / 2 kg
5G Frequency bands	Labkit O-RAN n48 : 3550-3700 MHz Labkit O-RAN n77 : 3800-4200 MHz Labkit O-RAN n78 : 3600-3800 MHz
Bandwidth	up to 100 MHz in 1x1 SISO, 2x2 MIMO and 4x4 MIMO
Max transmitted power	24 dBM (250 mW)
Operating Temperature Range	-40 °C to +55 °C
IP Rating	IP 31
Regulatory	CE (Europe), RoHS, WEEE, REACH (UK)
Powering	PoE ++ Type 3 IEEE802.3bt
Antenna	4 integrated antennas
Synchronisation	PTP

Crosscall Core-Z5 smartphone	
Dimensions H × W × D / weight	175 x 81 x 14 mm / 281 g
5G Frequency bands	NR-FDD n1 (2100MHz)/ n3 (1800MHz) / n5 (850 MHz) / n7 (2600MHz) / n8 (900MHz) / n20 (800MHz) / n28 (700MHz) + NR-TDD n38 (2600MHz) / n40 (2300MHz) / n41 (2500MHz) / n77 (3700MHz) / n78 (3500MHz)
Operating System	Android 12
Processor	Qualcomm® QCM6490
Head/Body SAR	1,5 W/kg - 1,03 W/kg
SAR Limbs	2,63 W/kg
RAM	4 Go
Flash	64 Go
IP Rating	IP 68
Resistance	salt water (2 m / 30 min), dust (IP 68), falls(6 faces, 2m on concrete)

Software

Core Network software	4G	5G
3GPP release	Release 15	Release 16
Modules	HSS, MME, S/P-GW	SMF, AUSF, UDM, AMF, UPF
Container	Docker	

Radio Access Network software	4G	5G
3GPP release	Release 15	Release 16
Frequency bands	All FDD & TDD bands under 6 GHz	All FR1 (< 6 GHz) FDD & TDD bands
Bandwidth	5, 10, and 20 MHz	up to 100 MHz
Transmission Modes	SISO 1x1 and MIMO 2x2 (Downlink)	SISO 1x1 and MIMO 2x2 (Downlink)
Modulation schemes	Up to 64QAM in DL and 16QAM in UL	Up to 64QAM in DL and 16QAM in UL
Subcarrier spacing	15 kHz	30 kHz