



TRIANGLE

*A platform for mobile services
and apps testing*

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TRIANGLE testbed

- TRIANGLE offers an end-to-end framework devoted to testing and benchmarking of mobile applications, services and devices.
- Built of commercial and open source components and equipment
- Full experiment automation and customized design



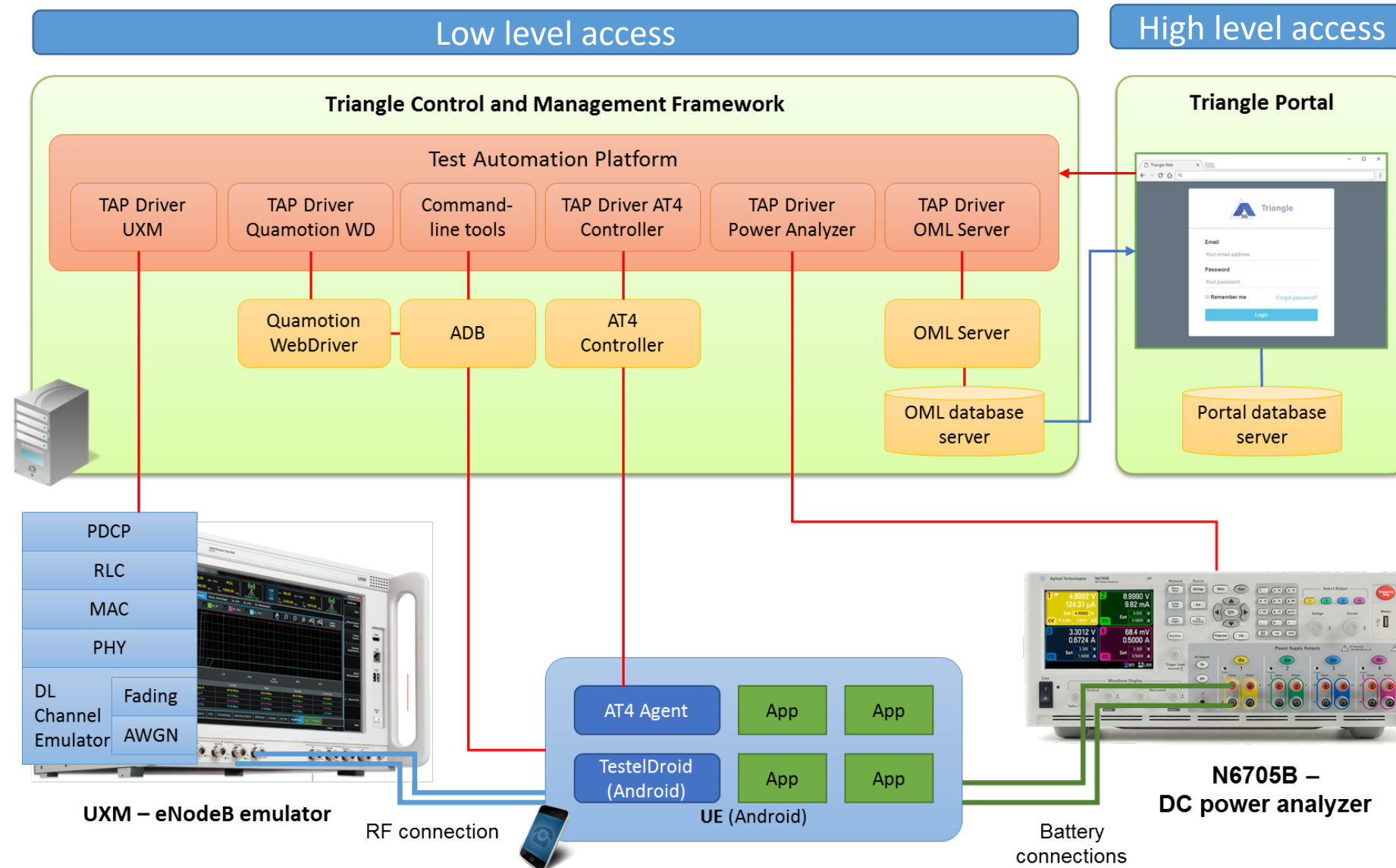
TRIANGLE Project
5G Applications and Devices Benchmarking

TRIANGLE project developments

- Testbed
- Testing methodology. Component management and configuration, measurement processing, computation of QoE, KPI and/or TRIANGLE mark...
- Test cases. Experiment definition: KPI to measure, scenario, equipment, etc...
 - Specify custom test case for experiments, or selection among set of pre-built test cases.
- Easy remote access through web portal, also low level access for advanced users



TRIANGLE architecture





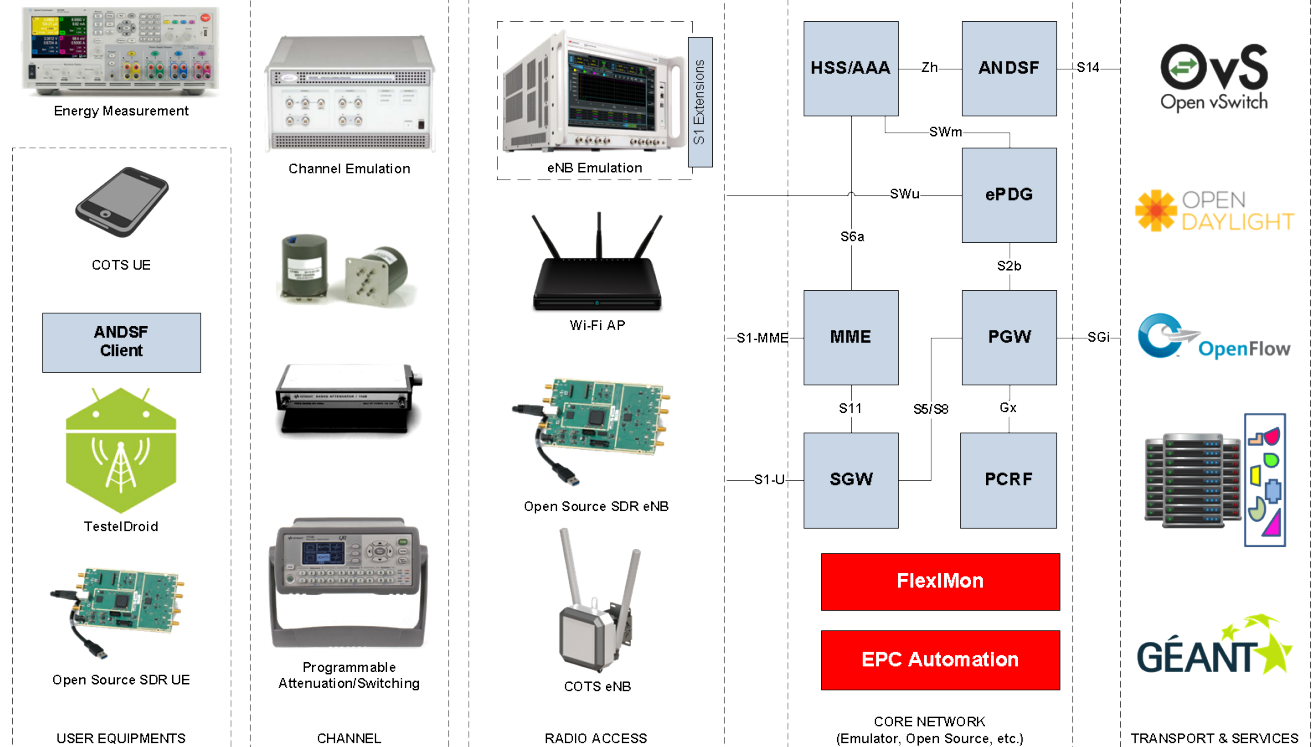
TRIANGLE components

RAN

- UXM eNodeB emulator
- SDR cards (e.g. OAI compatible)
- Commercial and open source eNBs
- Commercial and open source UEs

EPC

- Comercial: Polaris Networks
 - Release 13
 - Network impairments
 - Modular
- Open source
 - Different implementations: NextEPC, OAI



VIM

- Openstack for deployment of VMs

SDN

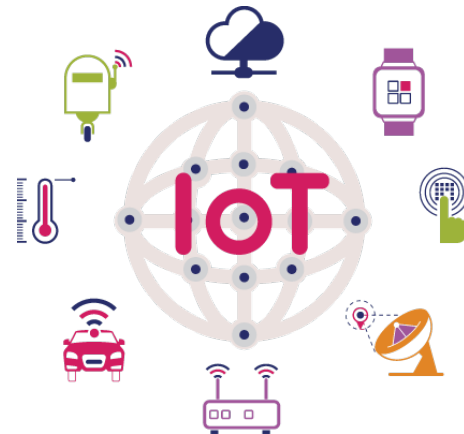
- OpenvSwitch





TRIANGLE features

- Power consumption analysis at UE
- Downlink channel emulation (UXM)
- Carrier aggregation
- NB-IoT support
- LTE – WiFi integration (LWIP)



TRIANGLE testbed



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TRIANGLE access procedure



www.triangle-project.eu



5GENESIS Málaga platform



www.5genesis.eu

One of the first three 5G experimentation facilities funded by EU

29 partners from 12 countries:



TRIANGLE



FED4FIRE
FEDERATION FOR FIRE PLUS

Thank you for your attention
Any question?



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