

innovating communications

The LENA project

an open source product-oriented
LTE/EPC Network Simulator

Presenter: Nicola Baldo

AENOR

ER

Gestión
I+D+i

UNE 166002

IDI-0024/2011

About CTTC

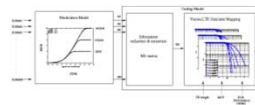
- Non-profit research center focused on telecommunications
- Funded in 2001, after a public initiative
- Mission:
 - foster innovation by making new scientific knowledge accessible
 - consolidate Barcelona's position as an important center of technology
 - help expand Spain's role within the European telecommunications research community and industry
 - contribute to the economic growth of the Catalan industrial context
- Financial support from the Generalitat de Catalunya and from research projects (both industrial and competitive funds)
- Research is both applied and fundamental
- More information: <http://www.cttc.es>

LENA project overview



- CTTC is working with Ubiquisys on the development of LENA, a simulation platform for LTE/EPC
- Objective: to allow LTE small/macro cell vendors to design and test Self Organized Network (SON) algorithms and solutions

The LENA project: an open source product-oriented LTE/EPC Network Simulator



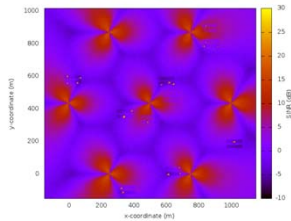
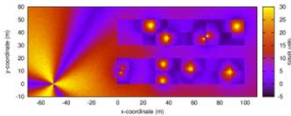
- A Product-oriented simulator:
 - designed around an industrial API: the Small Cell Forum MAC Scheduler Interface Specification
 - Allows testing of real code in the simulation
 - Accurate model of the LTE/EPC protocol stack
 - Specific Channel and PHY layer models for LTE macro and small cells
- An Open source simulator:
 - Development open to the community
 - Fosters early adoption and contributions
 - Helps building confidence and trust on simulation model
 - Candidate reference evaluation platform
 - Based on ns-3
 - Free and open source licensing (GPLv2)

The LENA project: *an open source product-oriented* *LTE/EPC Network Simulator*

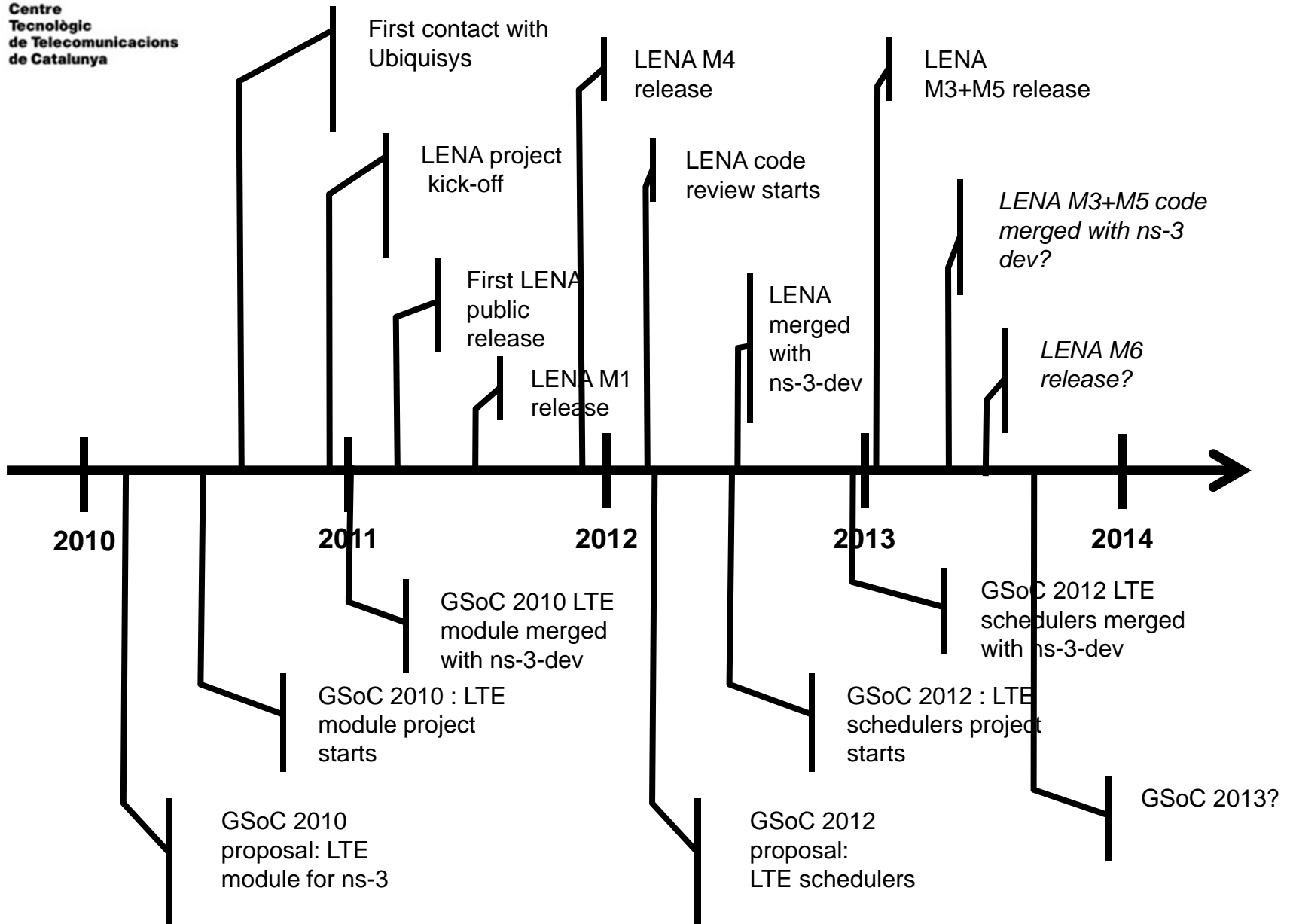


Target applications for LENA include the design and performance evaluation of:

- DL & UL Schedulers
- Radio Resource Management Algorithms
- Inter-cell interference coordination solutions
- Load Balancing and Mobility Management
- Heterogeneous Network (HetNets) solutions
- End-to-end QoE provisioning
- Multi-RAT network solutions
- Cognitive LTE systems



LENA timeline



LENA in numbers

- 90k lines of code in src/lte
 - about 19.4% of the ns-3 code in src/
- 116 pages of LTE module documentation
 - about 46% of the ns-3 models library documentation
- 45 PM original LENA workload estimate
- 5 CTTC LENA developers
 - N. Baldo, M. Miozzo, M. Requena, J. Nin, L. Parcerisa
- 2 GSoC student projects related with LENA
 - G. Piro, D. Zhou

Final remarks

- ns-3 is a great tool to work with
 - Contributing to the ns-3 community pays off
 - ns-3 is a good choice for industry
-
- More on the LTE module by the LENA project in the tutorial this the afternoon!