The LENA Project

a product-oriented open source LTE/EPC Network Simulator based on ns-3

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Centre Tecnològic de Telecomunicacions de Catalunya

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About the project

- CTTC working with Ubiquisys, the leading femtocell manufacturer
- Objective: develop a common platform for LTE femto/macro cell vendors to evaluate their different solutions
  - e.g., make sure that large and small cells from different vendors will work harmoniously before they are deployed
  - Open Source to foster adoption and contributions
- Use case: LTE-based Self Organized Networks
  - need to test SONs algorithms before deployment
  - Ubiquisys made extensive use of simulation to design its first generation of WCDMA intelligent femtocells
- Product –oriented:
  - Real-world interfaces for SON algorithms
  - FemtoForum MAC Scheduler API specification
  - Allow testing real code in the simulator
- Based on the ns-3 module developed for the Google Summer of Code (GSoC) 2010

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What has been done so far

- Started from the GSoC code
- PHY mostly reused, with some new features
  - Inter-cell interference
  - PHY synchronization
- MAC/RLC/RRC stack entirely rewritten
  - New design based on SAPs
  - Supports the FemtoForum MAC Scheduler API
  - Round Robin and Proportional Fair schedulers available
  - RLC API re-defined, simplified RLC available
- Documentation
  - Doxygen
  - Two sections in the ns-3 manual (FF API and LTE)

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Current Development

- Unit and system tests
- Integration with the ns-3 attribute system
- Simulation output
  - ns-3 trace sources for relevant LTE events
  - Dedicated trace sinks to calculate relevant KPIs

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Future Development

- RLC UM/AM and PDCP support
  - Necessary for IP networking
- Basic RRC messaging
- Error modeling
- HARQ/MIMO support
- Evolved Packet Core
  - Basic MME, SGW and PGW
  - Basic S1 and X2 support
    - Focus on X2 features enabling SONs

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Check it out

- Code available at http://code.nsnam.org/nbaldo/ns-3-lena-trunk/
- Feedback & contributions welcome!