

Simulation Model for LTE Networks using OPNET

The objective of this project is to build an integrated simulation model to comprehensively evaluate the performance of forthcoming LTE cellular networks. The simulation model targets to be used as practical tool by supporting accurate LTE standard models that adequately represent subscribers' profiles in terms of service requirements, generated traffic load and mobility behavior. The project shall be implemented using OPNET. OPNET is very powerful tool used extensively in the industry to investigate a diverse set of telecommunication network problems. The project is subdivided into the following sub-projects:

1. Network Dimensioning and Planning
2. Air Interface
3. Traffic Modeling
4. Mobility and Handoff
5. Channel Assignment Algorithms
6. Scheduling Algorithms

1. Network Dimensioning & Planning:

In this sub-project, the student will build a network design that includes (number of base stations, location of base stations, base station coverage, antenna settings, ... etc.) that would potentially support traffic demand and quality of service requirements within a given area.

2. Air Interface:

In this sub-project, the student will implement a routine to model the transmitted signals over the air interface in terms of small-scale (multi-path), large scale as well as signal to interference ratio calculations.

3. Traffic Modeling:

In this sub-project, the student will implement a traffic generator process. The traffic generator process supports accurate modeling of bit rate behavior of different services expected to become predominantly utilized within LTE cellular networks.

4. Mobility & Handoff:

In this sub-project, the student will implement practical mobility models for subscribers within a given cellular network. The mobility model should cover both pedestrians as well as vehicles.

The student will also investigate and implement handoff strategies that guarantee smooth and efficient handoff operation.

5. Channel Assignment Algorithms:

In this sub-project, the student will investigate and implement efficient channel assignment strategies within LTE cellular networks. Channel assignment strategies reflect the functionality of determining which channel to assign to which user in accordance to the channel quality as well as channel availability.

6. Scheduling Algorithms:

In this sub-project, the student will investigate and implement efficient scheduling algorithms for different services within LTE cellular networks. Scheduling strategies reflect the functionality of determining priorities and timings of assigning channels to subscribers in accordance to their delay and quality requirements.

The Project Plan for All Projects will be as follows:

Period	Task	Deliverables
Week 1 - Week 2	OPNET Learning + Literature Review	
Week 3	Simulation Model Design	Technical Report 1: Literature Review Report (.doc End of Week 3)
Week 4 – Week 6	Simulation Model Implementation	
Week 7	Simulation Model Testing + Initial Results Collection and Interpretation	Technical Report 2: Simulation Model (.doc End of Week 7)
Week 8 – Week 10	Simulation Model Tuning + Final Results Collection and Interpretation	Technical Presentation 1: Simulation Results (.ppt End of Week 10)
Week 10 – Week 12	Simulation Model Integration and Finalization + Thesis Writing	Bachelor Thesis Draft: (Mid of Week 11) Bachelor Thesis: (End of Week 12)