

Vienna LTE Simulators

System Level Simulator Documentation, v1.4r570

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Abstract

This document contains documentation on how to use the Long Term Evolution (LTE) System Level simulator [1] as well as some insight on its structure and the assumptions that were made while developing it. This document relates more on how to actually use the simulator. The concept and the structure of the simulator is described in more detail in [2].

I. FOREWORD

The LTE system level simulator is published under a non-commercial academic use license. Please make sure that you understand the terms and conditions of the license before you use any of the available software packages. Would you require a license different to a non-commercial academic one please contact Josep Colom Bono or Martin Taranetz.

The detailed license agreement for the LTE System Level simulator can be found in Section XVII. Please read the license agreement carefully.

II. RUNNING A SIMULATION

The main file of the LTE Link Level Simulator is `LTE_sim_main.m`, though you may normally run the simulation through a batch file such as `LTE_sim_launcher.m`, which performs the following tasks:

- Loading a configuration file of choice. See Section III for a list of configurable parameters.
- Executing the `LTE_sim_main.m` main simulation file.

III. SIMULATION PARAMETERS

Below you can find a list of the parameters that can be configured in the `LTE_load_params.m` file:

A. General parameters

- `LTE_config.debug_level`: configures how much debug text output is shown. Options are:
 - 0: no output.
 - 1: basic output.
 - 2: extended output.
- `LTE_config.show_network`: configures how much plots are shown. Options are:
 - 0: no plots shown.
 - 1: show some plots.
 - 2: show all plots, which includes one showing the moving User Equipments (UEs), which may slow down simulations significantly.
 - 3: show also the plots of the generated microscale fading traces.
- `LTE_config.frequency`: frequency in which the system is operating [Hz].
- `LTE_config.bandwidth`: system bandwidth. Allowed values are 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, and 20 MHz. These bandwidths are equivalent to 6, 15, 25, 50, 75, and 100 Resource Blocks (RBs) respectively.
- `LTE_config.UEs_only_in_target_sector`: defines whether UEs are created in the whole Region Of Interest (ROI) or just in the target sector. For the case where the UEs are just positioned in one sector, the other transmitters radiate at maximum power, just acting as interferers.
- `LTE_config.target_sector`: if UEs are only to be set in the target sector, this setting specifies which one that is. Set it to `center` for specifying the target sector to be the center one. (`sector_id` `sector_id`) otherwise.
- `LTE_config.nTX`: number of transmit antennas. Used to generate the microscale fading trace.
- `LTE_config.nRX`: number of receive antennas. Used to generate the microscale fading trace.
- `LTE_config.tx_mode`: the transmission modes are defined in TS 36.213-820 Section 7.1, page 12 [3].

Lte System Level Simulator Documentation Tu Wien

**Markus Rupp, Stefan Schwarz, Martin
Taranetz**

Lte System Level Simulator Documentation Tu Wien:

The Vienna LTE-Advanced Simulators Markus Rupp, Stefan Schwarz, Martin Taranetz, 2016-03-23 This book introduces the Vienna Simulator Suite for 3rd Generation Partnership Project 3GPP compatible Long Term Evolution Advanced LTE A simulators and presents applications to demonstrate their uses for describing designing and optimizing wireless cellular LTE A networks Part One addresses LTE and LTE A link level techniques As there has been high demand for the downlink DL simulator it constitutes the central focus of the majority of the chapters This part of the book reports on relevant highlights including single user SU multi user MU and single input single output SISO as well as multiple input multiple output MIMO transmissions Furthermore it summarizes the optimal pilot pattern for high speed communications as well as different synchronization issues One chapter is devoted to experiments that show how the link level simulator can provide input to a testbed This section also uses measurements to present and validate fundamental results on orthogonal frequency division multiplexing OFDM transmissions that are not limited to LTE A One chapter exclusively deals with the newest tool the uplink UL link level simulator and presents cutting edge results In turn Part Two focuses on system level simulations From early on system level simulations have been in high demand as people are naturally seeking answers when scenarios with numerous base stations and hundreds of users are investigated This part not only explains how mathematical abstraction can be employed to speed up simulations by several hundred times without sacrificing precision but also illustrates new theories on how to abstract large urban heterogeneous networks with indoor small cells It also reports on advanced applications such as train and car transmissions to demonstrate the tools capabilities

Development of a LTE System-level Simulator for Aircraft Cabins Albert Muñoz López, 2012 ANGL S Mobile broadband has changed the way we live and work The way we communicate is becoming enriched with higher speeds and exciting new services both at home on the road and on aircraft Nowadays a growing number of aircraft count with on board Global System for Mobile Communications GSM that enables the use of mobile phones during flight This is a result of the recent evolution of In Flight Entertainment and Connectivity IFEC systems which have experienced significant growth in the air transport industry In order to be commercially attractive such new communication services need high data rates high power efficiency low latency and a better quality of service Within this context the 3GPP Long Term Evolution LTE can make this happen However such systems require some Radio Frequency planning efforts to integrate them into the desired aircraft In these preliminary stages performance studies are commonly undertaken The current document specifies the design and implementation of a tool that aims to be useful for such studies This tool a simulator of on board LTE networks is able to simulate the in cabin LTE installations and to provide reliable results of LTE performance The LTE simulator described in this Thesis is a RESTful web application made of three parts 1 The processing unit CORE which carries out the simulations 2 The Application Programming Interface API as an abstraction layer between the processing unit and the Graphical User Interface 3 The Graphical User Interface GUI which

eases the user interaction with the system. This document is structured as follows: chapter 1 summarizes the objectives the project background and scope. Chapter 2 provides a theoretical background of 3GPP LTE. Chapter 3 describes the system at a high level through its requirements and gives an overview of the system design. Chapter 4 describes the various subsystems of the LTE system level simulator. Chapter 5 illustrates the usefulness of the developed LTE simulator by describing the simulation of a sample in cabin network installation. Finally chapter 6 contains a conclusions summary of the simulator and suggestions for future work.

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