

Vienna 5G System Level Simulator v1.0 - List of Features

General Functionality

The Vienna 5G System Level Simulator evaluates the average performance of large scale networks by means of Monte Carlo simulations.

- Multiple base station and user types in one simulation
- Flexible implementation using OOP in MATLAB
- Several performance metrics are evaluated (SINR, average user throughput etc.)
- Downlink transmission

Network Elements

Base station, user and blockage types can be defined freely (number of antennas, transmit power, position) and used simultaneously in one simulation

- Macro, pico, femto cells
- Vehicular, pedestrian, indoor users
- Buildings/blockages

Propagation Models

Several models for propagation effects are combined to large scale and instantaneous SINR

Incorporated propagation effects:

- Large scale path loss
- Shadow fading
- Antenna pattern
- Small scale fading
- Influence of blockage objects

Network Geometry

Placement of network elements is 3D in general. Interference region for reliable results.

Geometry options:

- Gauss Cluster
- Hexagonal Grid
- Manhattan Grid
- Predefined
- Uniform Cluster
- Uniform PPP
- User trajectory

Transmission parameters

Flexible parameterization of transmission frame structure:

- Symbol intervals
- Subcarrier spacing

Path Loss Models

Path loss model is chosen dependent on the link state, i.e., LOS/NLOS, user height, indoor/outdoor.

Supported large scale path loss models are:

- Fixed
- Free Space
- Indoor
- Rural
- Suburban Macro
- UMa
- UMa3D
- UMi
- UMi3D
- Urban

Scheduler

Scheduler decision done per base station.

Supported schedulers are:

- Round Robin
- Best CQI

Channel Models

With exception of the 3D channel models, channel traces are pregenerated before the main simulation

Supported channel models are:

- AWGN
- Hilly Terrain
- PedA
- PedB
- Rural Area
- Rayleigh
- Typical Urban
- VehA
- VehB
- extended Ped B

Feedback

Quantized feedback for CQI according to the LTE-A standard.

Performance Evaluation

Simulation results:

- ecdf of SNR/SINR
- ecdf of avg. user throughput