

# Vienna LTE-A Downlink Link Level Simulator v1.4

## Q2-2016

### List of Features

#### PERFORMANCE METRICS

- Frame Error Ratio (FER) (coded / uncoded)
- Throughput (coded / uncoded / useful)
- Bit Error Ratio (BER) (coded / uncoded)
- Block Error Ratio (BLER) (coded /uncoded)

#### SIMULATION PARAMETERS FOR CONFIGURATION

##### *General Parameters*

- Frequency (and Frequency Offset)
- Bandwidth
- Transmission mode
  - 1) Single antenna
  - 2) Transmission Diversity (TxD)
  - 3) Open Loop Spatial Multiplexing (OLSM), Spatial Multiplexing with Cyclic Delay Diversity (CDD)
  - 4) Closed Loop Spatial Multiplexing (CLSM)
  - 5) Multiuser-MIMO
  - 6) Rank-1 CLSM
  - 8) Non-standard Defined Precoding
  - 9) Eight Layer Spatial Multiplexing

##### *Small Scale Fading*

- Type of Power Delay Profile (PDP)
  - Additive White Gaussian Noise (AWGN)
  - Flat Rayleigh
  - ITU Pedestrian A-, B- and correlated channel
  - ITU Vehicular A- and B channel
  - 3GPP Typical Urban Area (TU), Rural Area (RA), Hilly Terrain (HT)
  - Winner II+ based channel model
  - 3D Model 3GPP TR 36.873
- Type of Filtering
  - Block Fading
  - Fast Fading

##### *User Equipment (UE) and eNodeB Settings*

- Number of Transmitter Antennas
- Number of Receiver Antennas
- Channel Estimation Methods
  - Perfect
  - Least Squares (LS)
  - Minimum Mean Square Error (MMSE)
- Equalizer
  - MMSE Interference Alignment (IA)
  - Zero Forcing (ZF)
  - Soft Sphere Decoder (SSD)

### *Scheduler Settings*

- Round Robin
- Fixed
- Best Channel Quality Indicator (CQI)
- Proportional fair

### *Uplink Channel Options*

- Delay of feedback channel
- Quantized or unquantized CQI feedback

### PRECONFIGURED SETUPS

- Multiple eNodeBs
- Distributed Antenna Systems (DAS) (with Block Diagonalization (BD))
- IA
- LTE Multi-User Multiple-Input and Multiple-Output (MU-MIMO) Quick Test
- LTE-A Single-User Multiple-Input and Multiple-Output (SU-MIMO) Quick Test
- LTE MU-MIMO
- LTE-A MU-MIMO
- LTE SU-MIMO
- LTE-A SU-MIMO
- LTE Multi-User Single-Input and Single-Output (MU-SISO)
- LTE Single User (SU) Quick Test
- LTE Single-User Single-Input and Single-Output (SU-SISO)
- 3D Channel Model based on TR 36.873
- Winner II Channel Model
- Transmission Mode Test