



E8895 3GPP LTE Wireless Library

The new **ADS 3GPP LTE Wireless Library** incorporates the latest specification in the evolving 3GPP Long Term Evolution standard based on Release-8 of standard June 2006. 3GPP LTE Baseband engineers can now rely on a reference standard of evolving models and testbenches to verify that their design conforms to the evolving specs.

For RF Engineers who want to verify the performance of their system, 3GPP LTE WL offers a set of pre-configured testbenches that use baseband and RF models in an integrated environment for validation of the overall system.

Keeping up with the continuous growth in mobile communication, 3GPP LTE needs to meet certain characteristics such as:

- Reduced cost per bit.
- Increased service provisioning - more services at lower cost with better user experience.
- Flexibility of use of existing and new frequency bands.
- Simplified architecture, Open interfaces.
- Allow for reasonable terminal power consumption.

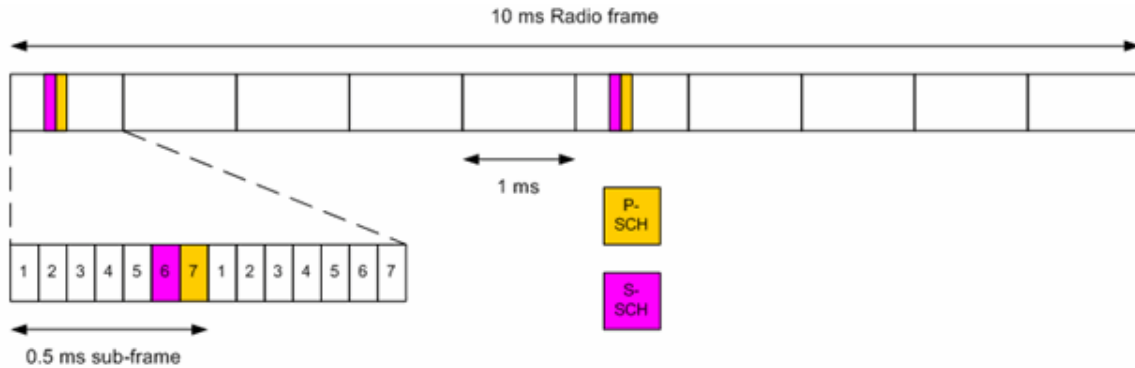
Features

The current features of the library include:

Downlink uncoded signal source based on OFDMA technology.

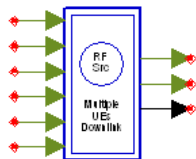
1. Supports 10 ms frame.
2. Supports sub-frame format including short CP and long CP.
3. Bandwidth selectable as 1.25 MHz, 2.5 MHz, 5.0 MHz, 10.0 MHz, 15.0 MHz and 20 MHz. The numbers of occupied sub-carriers for each bandwidth are 76, 151, 301, 601, 901 and 1201, respectively.
4. Modulation type selectable as BPSK, QPSK, 8-PSK, 16-QAM and 64-QAM.
5. Supports P-SCH and S-SCH, 1 P-SCH and S-SCH every 10 sub-frames, P-SCH is at last OFDM symbol and S-SCH is at the second last OFDM

- symbol of the 0th/10th sub-frame, using only 1.25 MHz BW (72 center most sub-carriers). (See illustration below.)
- 2 pilot OFDM symbols per sub-frame (1st and last threeh OFDM symbol in the sub-frame) using only every 6th sub-carrier for pilot Tx antenna, other might be used for data. Pilot sequence is distributed over 4/5 sub-frames (same as SCH periodicity). The pilot sequence is CAZAC.
 - Supports BCH, 1 BCH every 4th/5th sub-frame, last OFDM symbol of the 1st sub-frame, using only 1.25 MHz BW (75 center most sub-carriers, same as SCH periodicity).



P-SCH is placed in the last and S-SCH in the second last OFDM symbol of the first sub-frame

Downlink Source Schematic



LTE_DL_Src_MultipleUEs_RF

L1

R0ut=50 Ohm

RTemp= 273.15

FCarrier=3407 MHz

Power={10.0, 10.0, 10.0, 10.0, 10.0, 10.0}

MirrorSpectrum=NO

GainImbalance=0.0

PhaseImbalance=0.0

I_OriginOffset=0.0

Q_OriginOffset=0.0

IQ_Rotation=0.0

Bandwidth=BW 5 MHz

OversamplingOption=Ratio 1

CyclicPrefix=Short

UEs_FDMA_Mode={ 0, 0, 0, 0, 0}

UE1_PRB_Bitmap={ 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0}

UE2_PRB_Bitmap={ 0, 0, 0, 1, 1, 1, 0, 0, 0, 0, 0}

UE3_PRB_Bitmap={ 0, 0, 0, 0, 0, 0, 1, 1, 1, 0, 0}

UE4_PRB_Bitmap={ 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1}

UE5_PRB_Bitmap={ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}

UE6_PRB_Bitmap={ 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}

WindowType=Tukey

CyclicInterval=6

BCH_Enable=NO

AllocTable_Enable=NO

AllocTab_Factor=1.0

PSCH_Factor=1.0

SSCH_Factor=1.0

BCH_Factor=1.0

RS_Distance=6

RS_Factor=1.0

RS1_Position=0

RS1_Offset=1

RS2_Enable=NO

RS2_Position=4

RS2_Offset=4

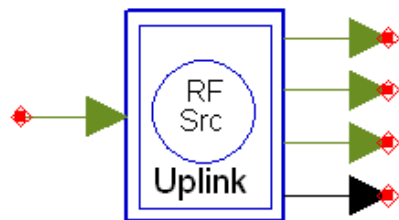
UEs_RPF={ 3, 3, 3, 3, 3}

UEs_StartSubcarrier={ 0, 0, 0, 0, 0}

Uplink uncoded signal source based on SC-FDMA technology.

1. Uplink sub-frame format (6 long blocks (LB) and 2 short blocks (SB)).
2. Bandwidth can be selected as 1.25 MHz, 2.5 MHz, 5.0 MHz, 10.0 MHz, 15.0 MHz and 20 MHz. The numbers of occupied subcarriers for each bandwidth are 75, 150, 300, 600, 900 and 1200, respectively.
3. Modulation type can be selected as BPSK, Pi/2 shifted BPSK, QPSK, Pi/4 shifted QPSK, 8-PSK, 16-QAM and 64-QAM. Uplink Source Schematic

Uplink Source Schematic



LTE_UL_Src_RF

L1

ROut=50 Ohm

RTemp=- 273.15

FCarrier=3407 MHz

Power= 0.01 W

MirrorSpectrum=NO

GainImbalance=0.0

PhaseImbalance=0.0

I_OriginOffset=0.0

Q_OriginOffset=0.0

IQ_Rotation=0.0

Bandwidth=BW 5 MHz

OversamplingOption=Ratio 1

FDMA_Mode=Localized

PRB_Bitmap={1,1,1,1,1,1,1,1,1,1,1,1}

UENumOfRB=12

WindowType=Tukey

CyclicInterval=6

RPF=12

StartSubcarrier=0

RACH_Enable=NO

T_RAREP=20

PreambleSequence=1

RACH_Factor=1

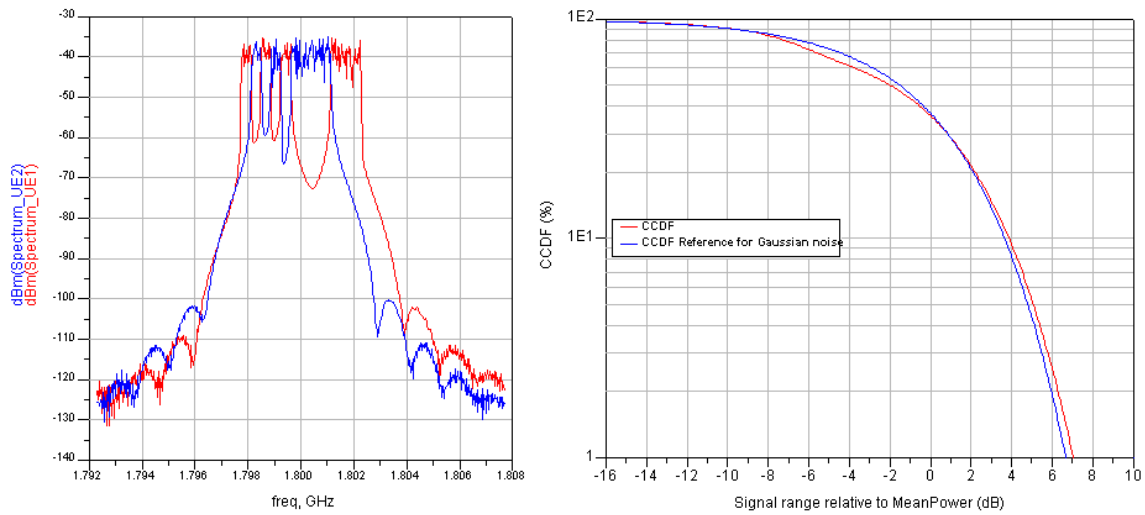
SB_Factor=1

Transmitter Measurements

The following Transmitter measurements are performed for both Uplink and Downlink subframes: Spectrum

- Waveform
- CCDF
- Spectrum

CCDF simulation plots for two downlink signals



Required ADS Modules

Besides 3GPP LTE Wireless Library the other ADS modules needed are:

- Design Environment (E8900)
- Data Display (E8901)
- Agilent Ptolemy Simulator (E8823)