

# LTE uplink Simulator

Current status

# Uplink structure

- Basic classes are the same
  - BS, BS\_output, UE, UE\_output
  - Properties related to uplink \*\_UL, files LTE\_UL\_\*
  - Main loop (prepared for parallel toolbox):
    - for cqi
      - for SNR
        - » for users
          - LTE\_TX
          - Channel
          - RX
        - » end
        - » update simulation results
      - end
    - end

# Functions call

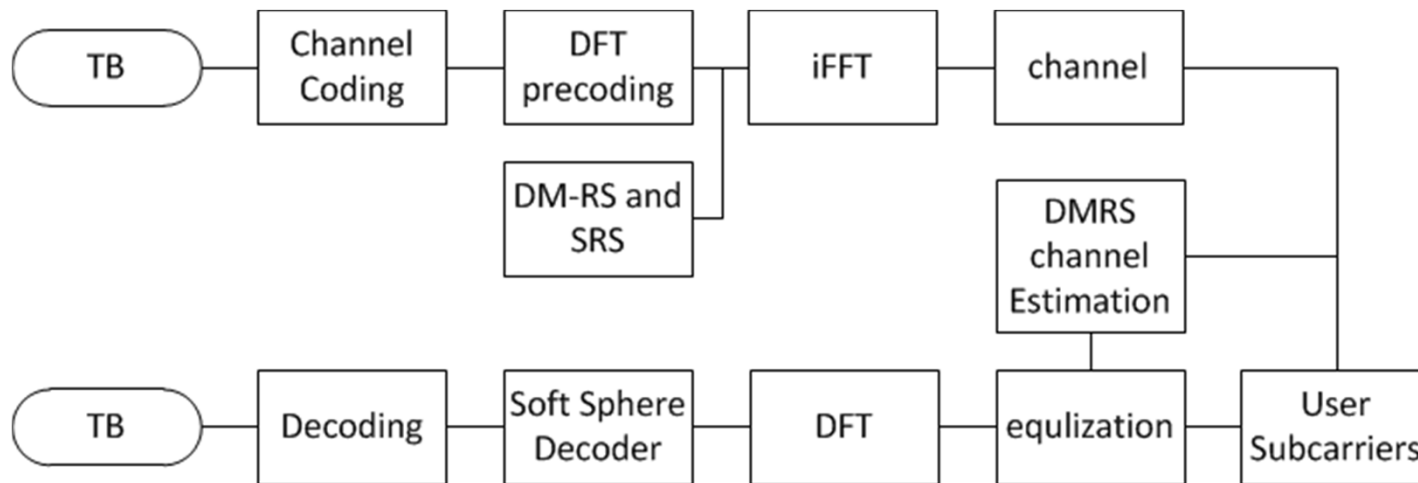
```
for uu=1:nUE
    LTE_UL_TX(LTE_params, UE(1,uu), BS, subframe_i,
    UE_output(1,uu), BS_output, cqi_i,uu);

    [ChanMod_output{uu}] =
        LTE_UL_channel_model(LTE_params, ChanMod,
        ChanMod_output{uu}, UE_output(1,uu),
        SNR(uu));

    LTE_UL_2_RX(LTE_params, ChanMod_output{1,uu}, ChanMod,
    SNR(uu), BS.AtPort, subframe_i, BS, UE, UE_output(1,uu),
    BS_output, uu);
end
```

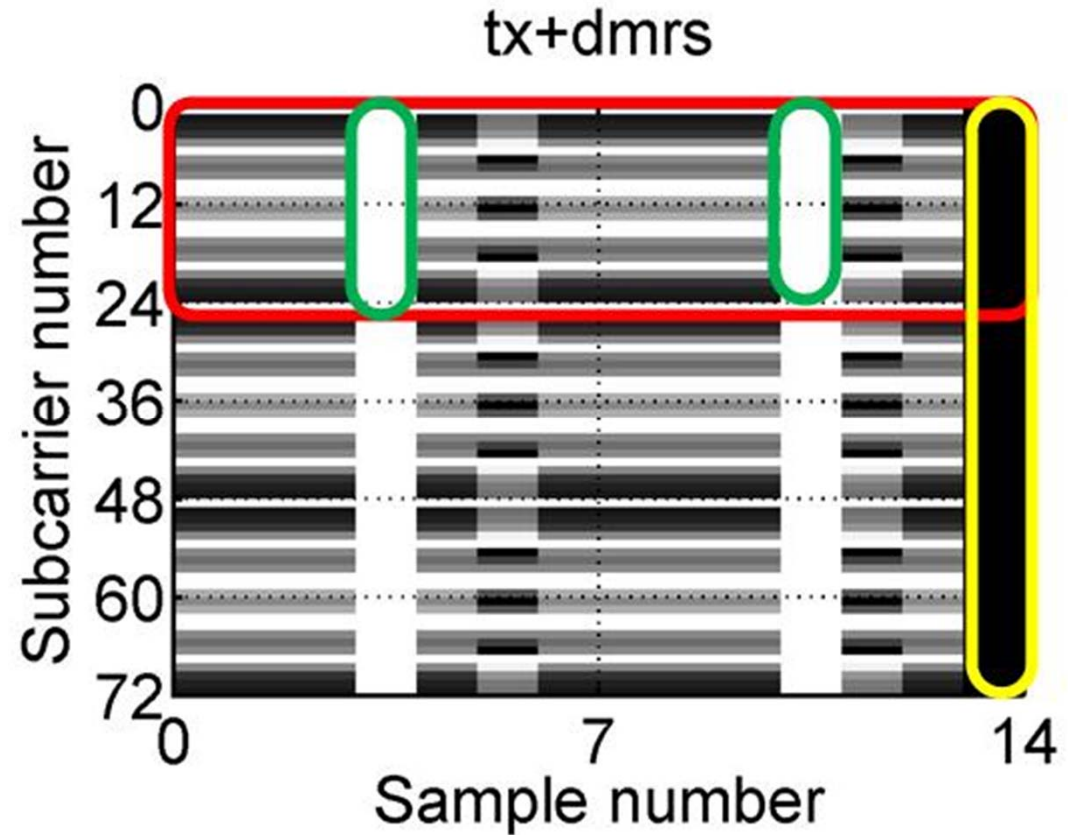
# PHY

- SC-FDMA, DFT per number of user subcarriers
- DMRS inserted to each slot, SRS optional, in whole bandwidth
- SRS periodicity [2 5 10 20 40 80 160 320] subframes



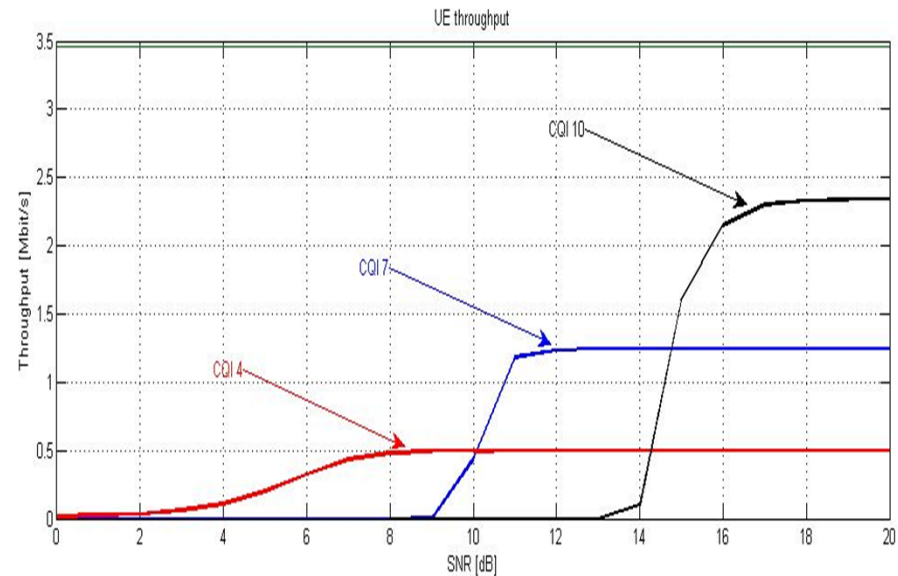
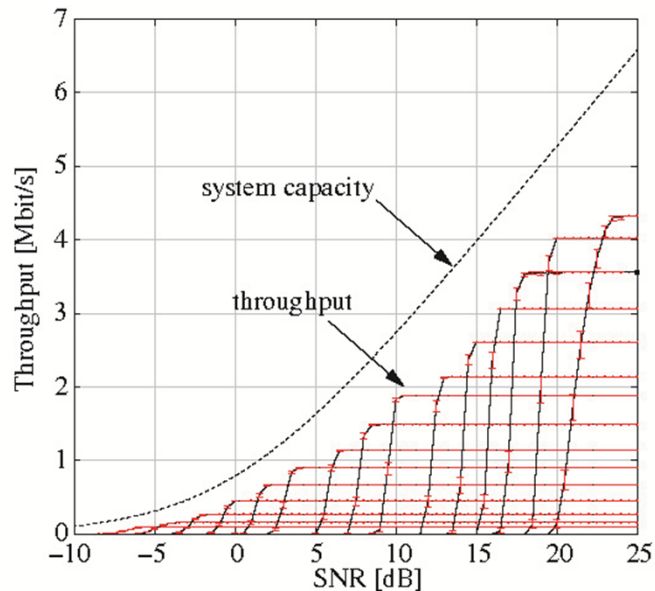
# Resource grid

- Round robin scheduler adapted for uplink, users have assigned same resource blocks in the subframe,
- Number of bits
- DMRS used for channel estimation,
- SRS is wideband channel estimation, implemented, but not used



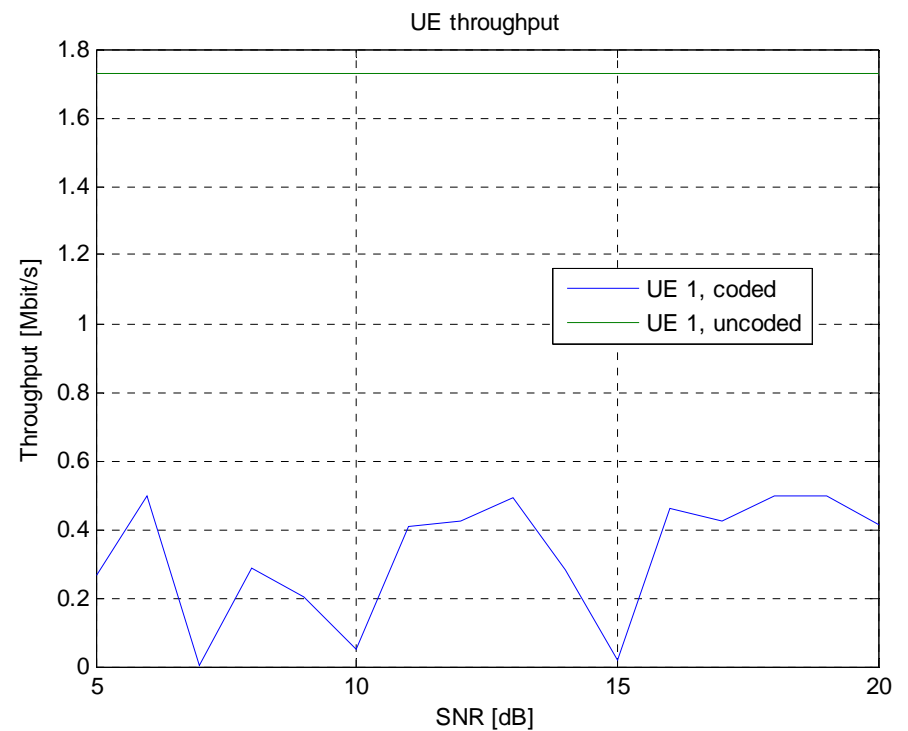
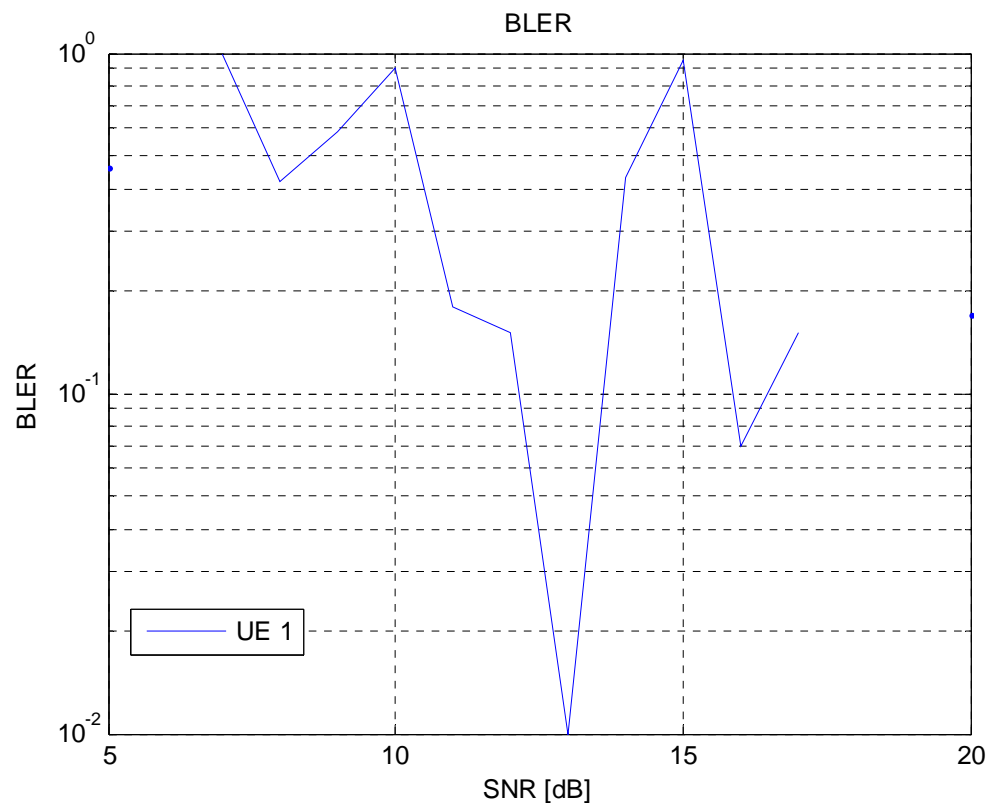
# Results AWGN

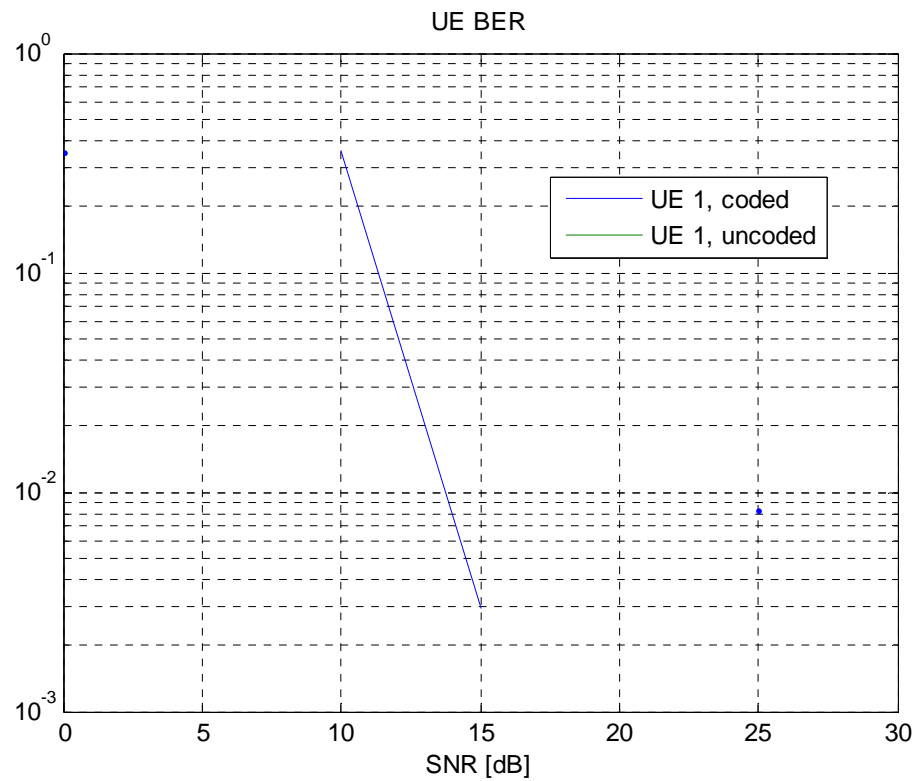
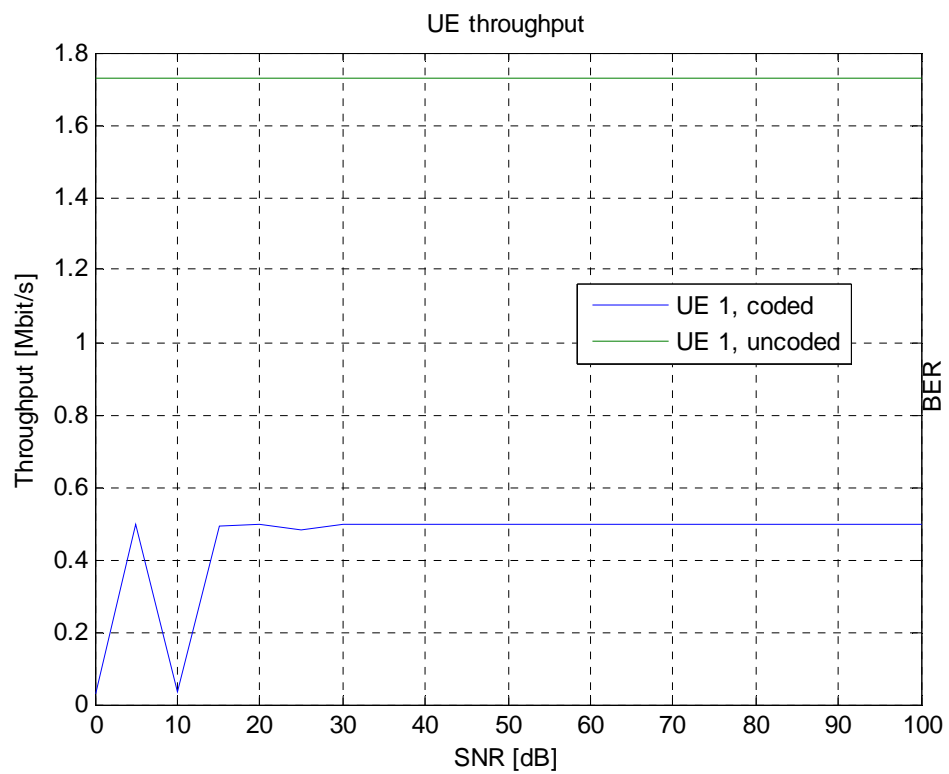
- Shape of the curves OK
- Approx. 3dB shift in BER, but corresponds to presented results in first release,
- Works for all cqi



# Results fading channels

- In this case, only High SNR is ok
- Tested for PedA, PedB, VehA, Flat Rayleigh, TU

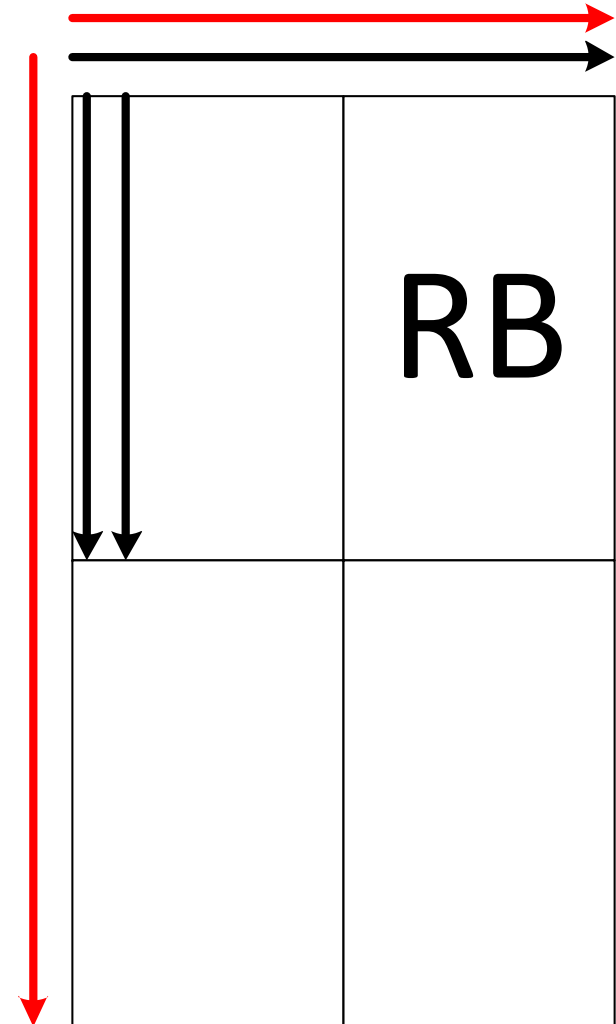






# Possible errors

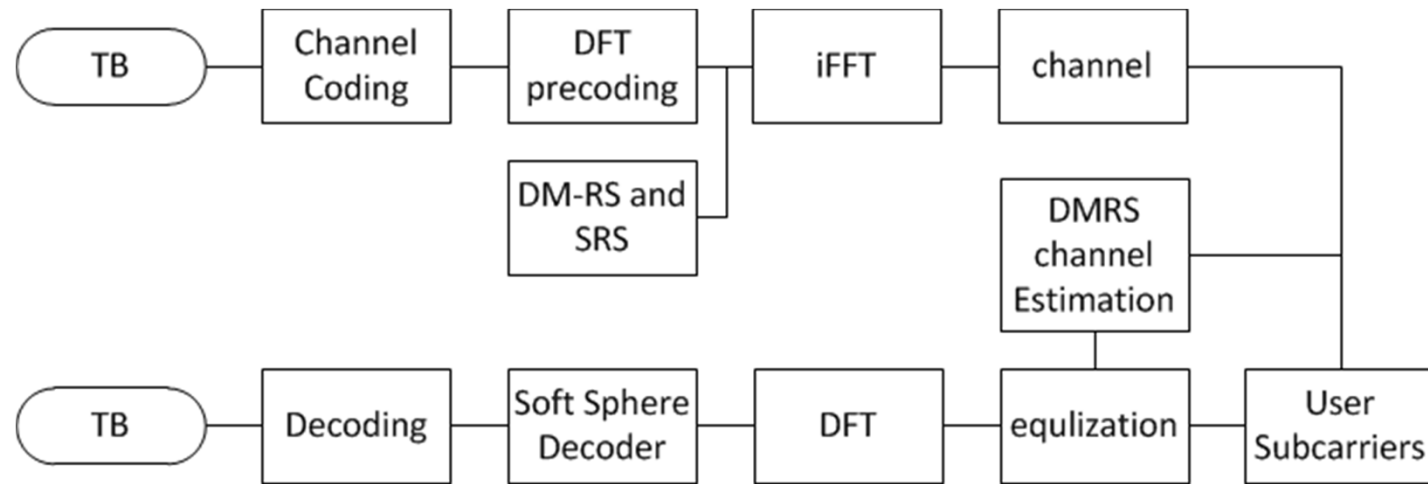
- Channel estimation is OK
  - verified estimation error
  - Simulations with “Perfect” channel knowledge suffers same bug
  - Fixed errors in resource grid assignment on Rx side
  - Tested several symbol allocations,
  - Rx corresponds to Tx



# Cont.

- Rate matching and channel coding
  - Scrambling is off
  - Is interleaving in turbo decoder OK?
  - Bit positions after SSD?
  - Checking saving of results (ACKs), all values are initialized as False ?
  - Wrong reading/writing from results object
  - Why it works for AWGN but not for fading???

# Noise enhancement in SSD?



The stay was supported by the WICOMT project

CZ.1.07/2.3.00/20.0007



INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ