



EUROPEAN
COMMISSION

Community Research



PHYLAWS

PHYSical LAYer Wireless Security Advisory Board - Year 1 Meeting - Part G

Telecom Paris Tech, room B603, 46 rue Barrault,
75013 Paris, 2 october 2013

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AB year 1 Meeting TPT, Paris, 2-October-2013

PHYLAWS FP7 ICT call 8 - Id 317562



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**G/
Submission of simulation items
to be followed on
(VTT + TCS)**

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Work Package 6: Simulation study case — LTE systems

Overview of LTE

Main objectives.

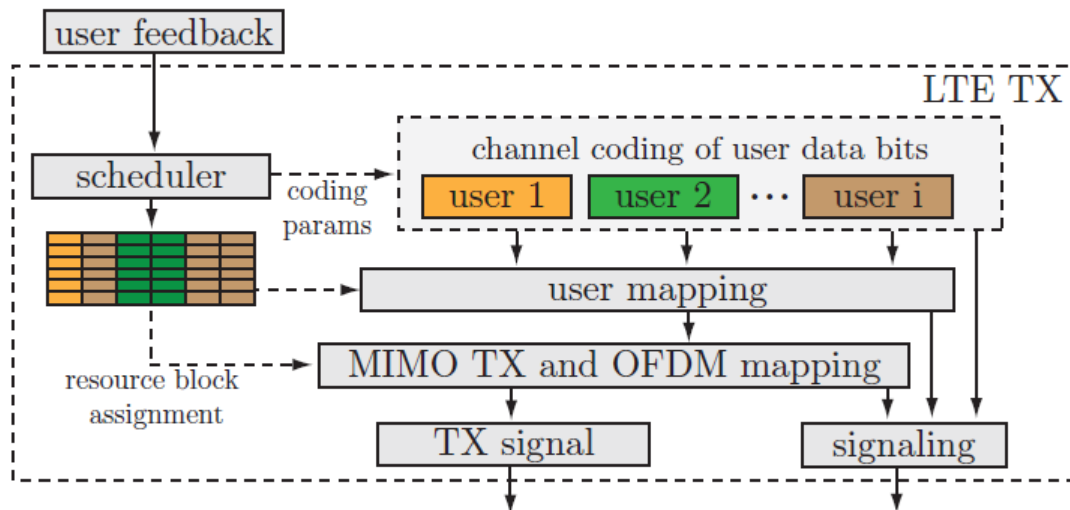
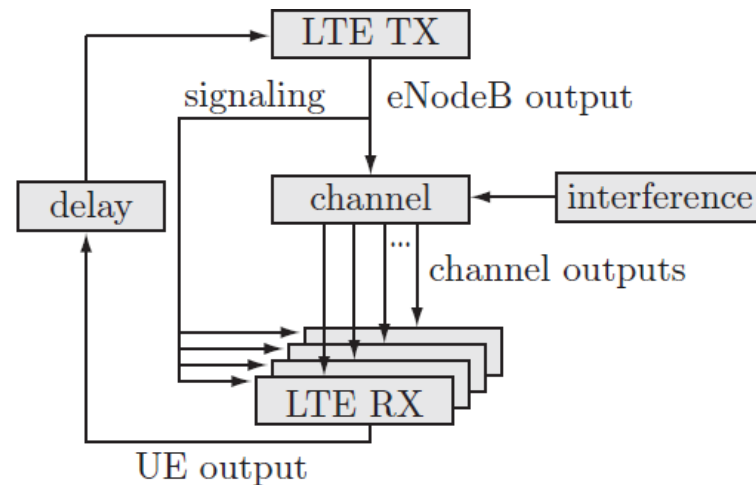
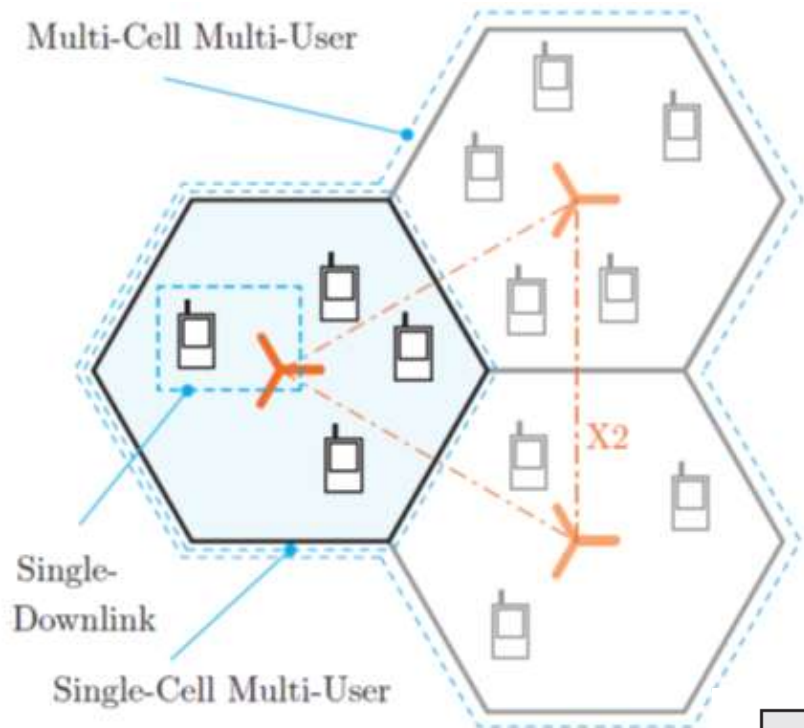
Description of work.

List of deliverables.

Description of tasks.

Overview of LTE simulator.

Overall structure of LTE and simulator (Downlink part)



Long-term-evolution simulators developed by Technical University of Vienna

Main objectives of the simulation:

- Specify and build **MIMO channel models** for transmission channels between **transmitter and legitimate receiver** as well as **transmitter and eavesdropper** for different interception configurations in LTE-based cellular systems.
- Simulate realistic transmission and interception of the relevant waveform signal in **various interception** configurations.
- Implement and test proposed **PHYSEC** enhancements in LTE-based simulator.

In general, the work done in WP6 will reinforce/illustrate **standardization proposals** of WP3/WP4 by simulated test cases in **LTE-based systems**.

Description of simulation work:

Prerequisites

- Selection of suitable upgrades to physical layer security in Work Package 3

Three tasks:

- Modeling of LTE-based cellular system
- Simulation of interception of waveform signals in LTE-based cellular system
- Conclusion of the work package and proposals for standardization

Work effort:

- 34 person-months over 24 months

List of simulator's outputs/deliverables:

Expected results:

- D6.1 Modeling of LTE-based cellular system [month 18]
- D6.2 Simulation of interception of waveform signals in LTE-based cellular system [month 35]
- D6.3 LTE-based cellular system simulations – **Concluding** of the work package and proposals **for standardization** [month 36]

Modeling of LTE-based cellular system:

Objective:

- Specify and build **MIMO channel models** for transmission channels between **transmitter and legitimate receiver** as well as **transmitter and eavesdropper** for different interception configurations in LTE-based cellular systems.

Work effort:

- 6 person-months over 6 months

Outcome:

- Simulation model and preparation of Deliverable 6.1 [month 18]

This task will complement the modeling performed in Task 3.1 by introducing an “LTE sensing” of the channel impulse response with its own performance limitations.

Simulation of interception of waveform signals in LTE-based cellular system:

Prerequisites

- Selection of suitable upgrades to physical layer security in Work Package 3

Objective:

- Simulation of the interception of waveform signals in an LTE-based cellular system. In particular, we will simulate the transmission and interception of LTE signals in uplink and downlink scenarios, with and without proposed PHYSEC enhancements, in order to quantify the effect of various security improvements.

Work effort:

- 16 person-months over 18 months

Outcome:

- Simulation model and contribution to Deliverable 6.2 [month 35]

Simulation of interception of waveform signals in LTE-based cellular system:

List of possible upgrades to physical layer security:

- Secrecy coding
- Tagging signals and/or fingerprinting in signaling channels,
- Advanced encryption with physical inputs into the shared context
 - Strengthening session keys with physical inputs

Conclusion of the work package and proposals for standardization:

Prerequisites

- Simulation model and simulation results from Tasks 6.1 and 6.2

Objective:

- Preparation of concise simulation report that summarizes the main simulation results and possible proposals for standardization.

Work effort:

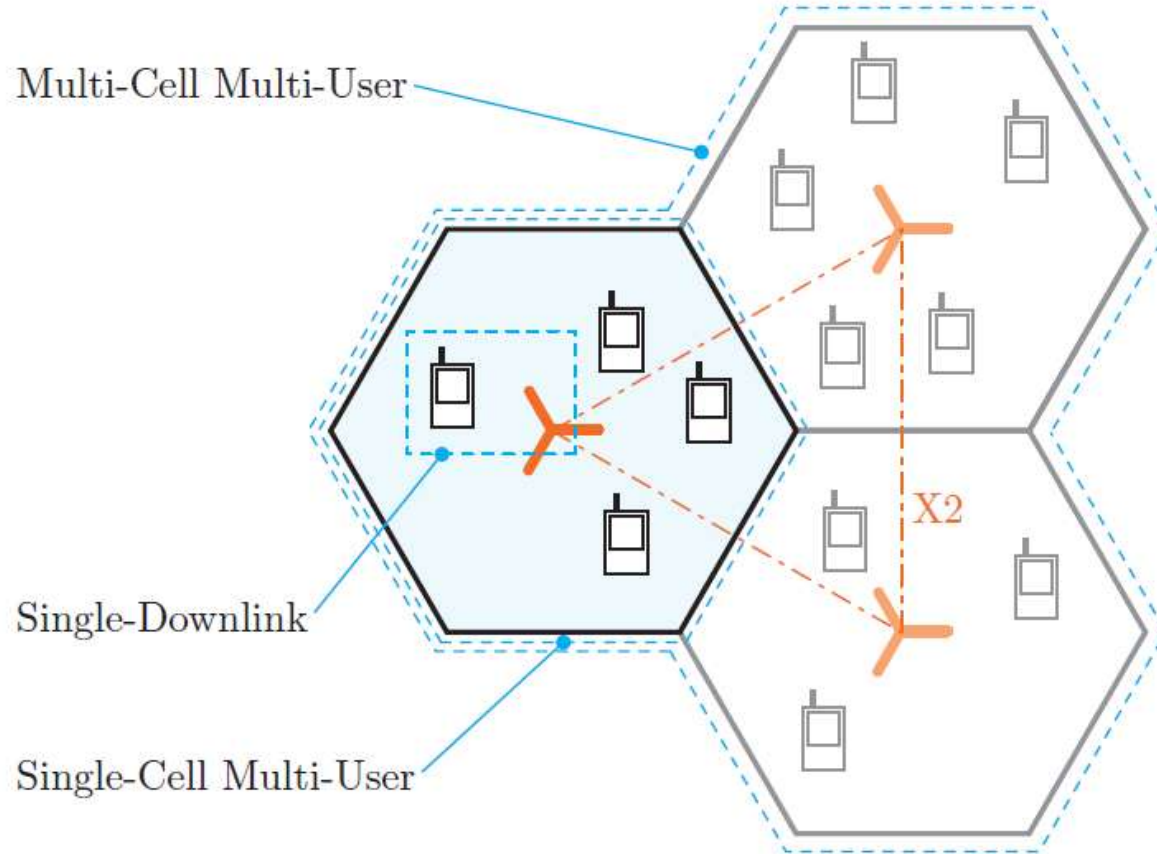
- 1 person-months over 1 month

Outcome:

- Simulation report/Deliverable 6.3 [month 36]

Overview of the LTE simulator

Long-term-evolution simulators developed by Technical University of Vienna



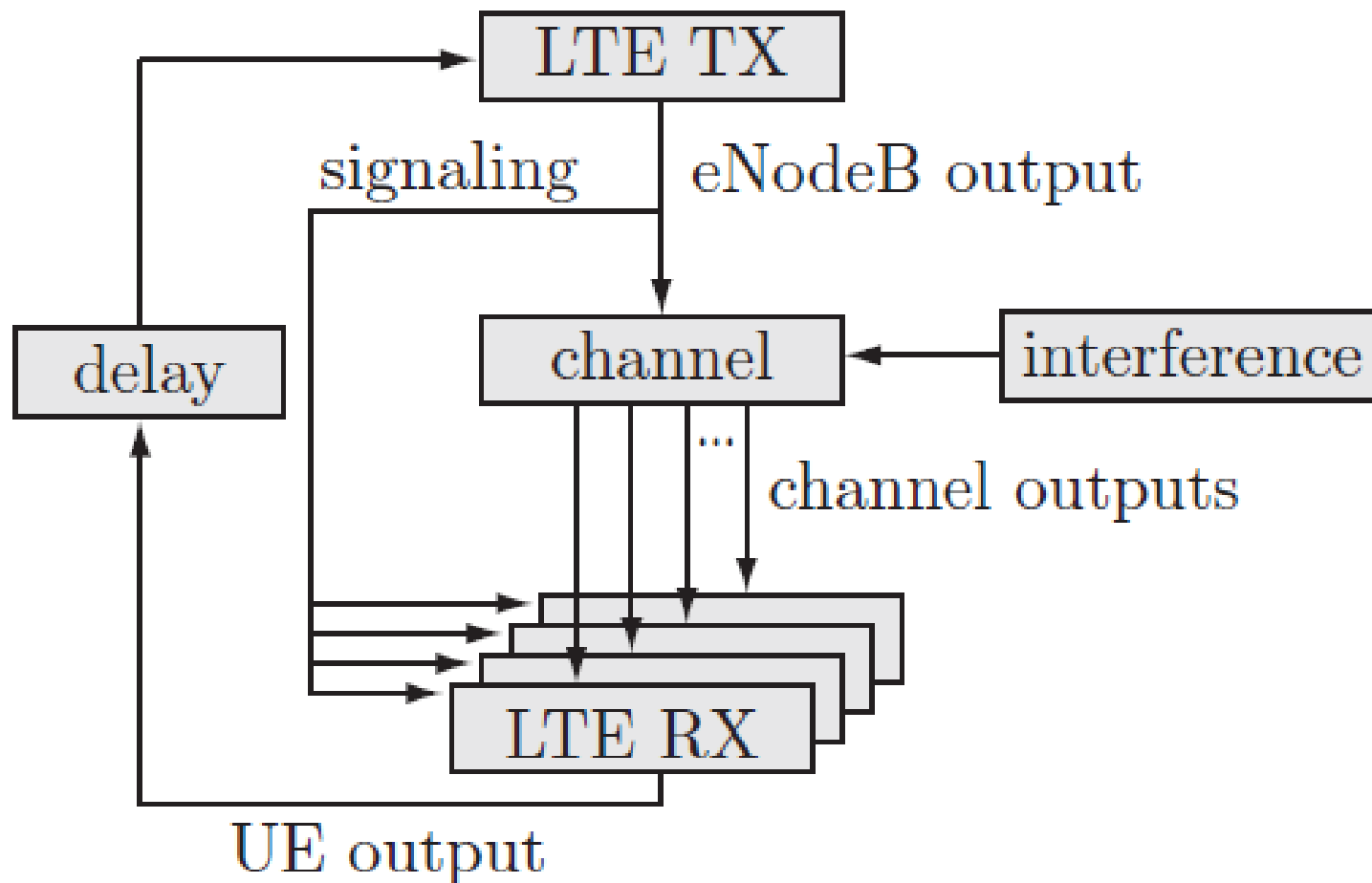
Overview of the LTE simulator (following)

Available channel models:

- AWGN
- Frequency-nonselctive Rayleigh fading
- ITU-R models: Pedestrian A/B and vehicular A/B
- 3GPP : typical urban, rural area, hilly terrain
- Optional channel models (reported as work in progress by developers):
 - 3GPP Spatial Channel Model
 - 3GPP Extended Spatial Channel Model
 - WINNER II channel model

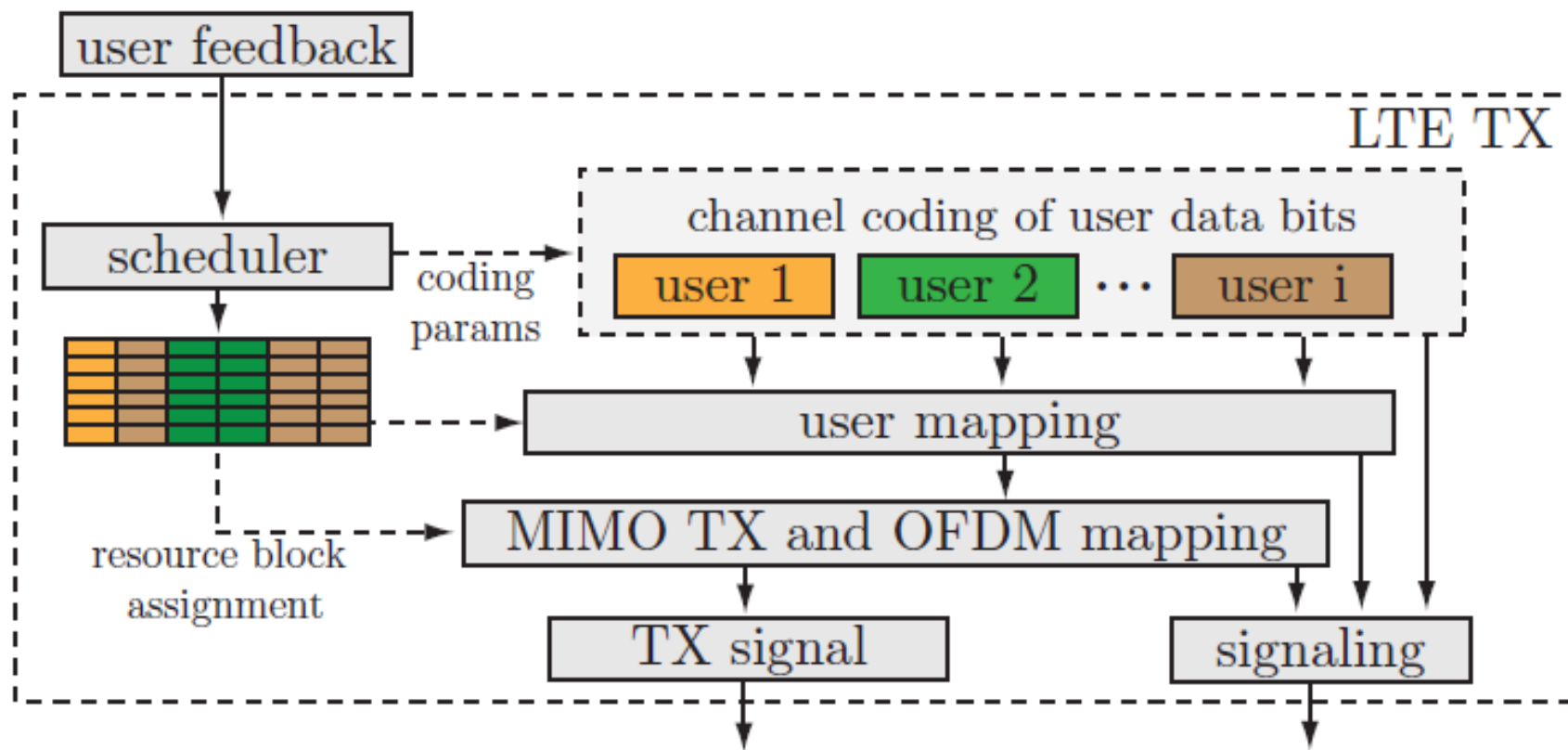
Overview of the LTE simulator (following)

Overall structure (Downlink)



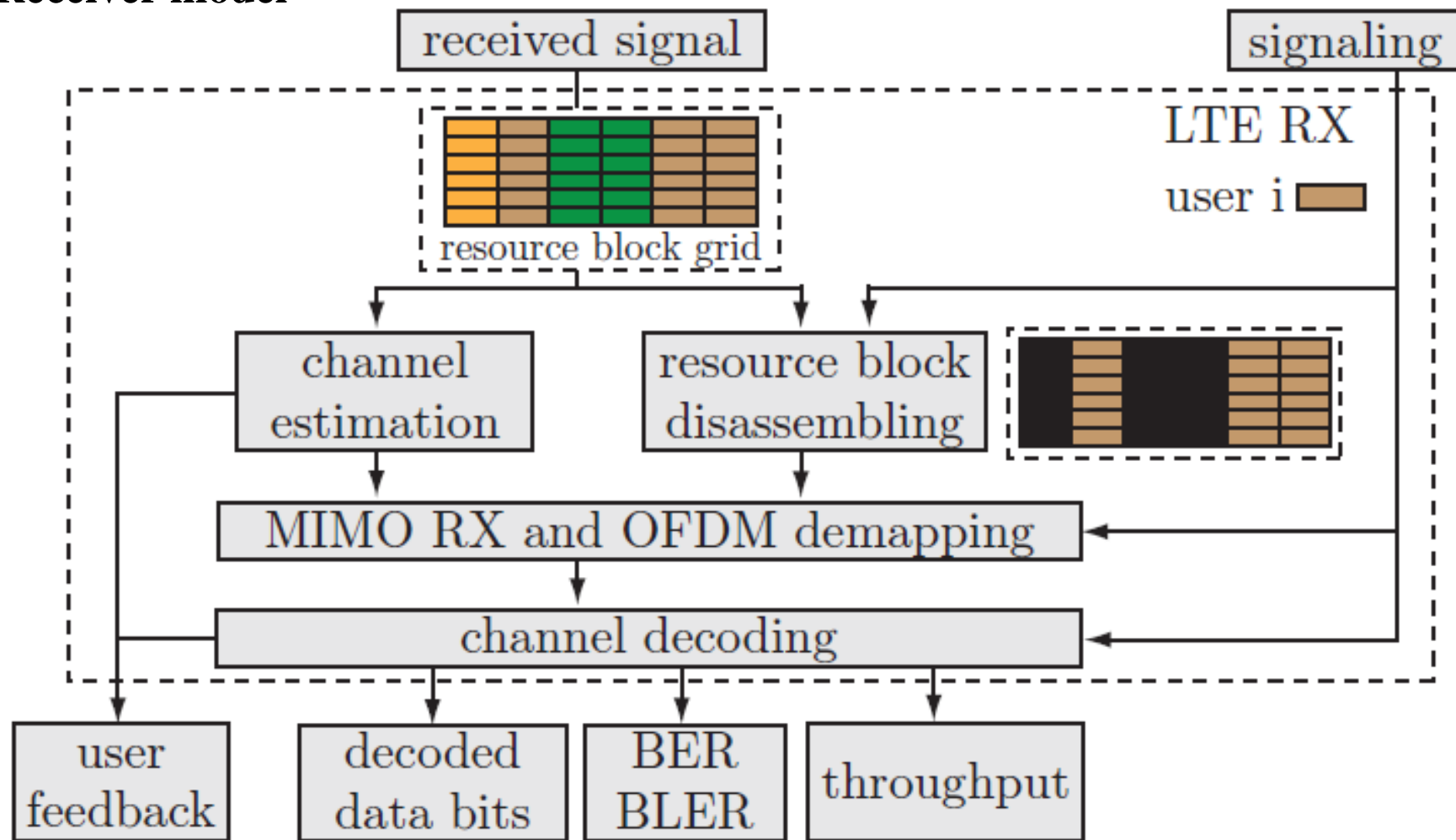
Overview of the LTE simulator (following)

Transmitter model



Overview of the LTE simulator (following)

Receiver model



Interactive discussion of partners with Advisory Board members

See deliverable D.1.12
“Advisory Board Year 1 Meeting Report”