A Heterogeneous Approach for Wireless Network Simulations

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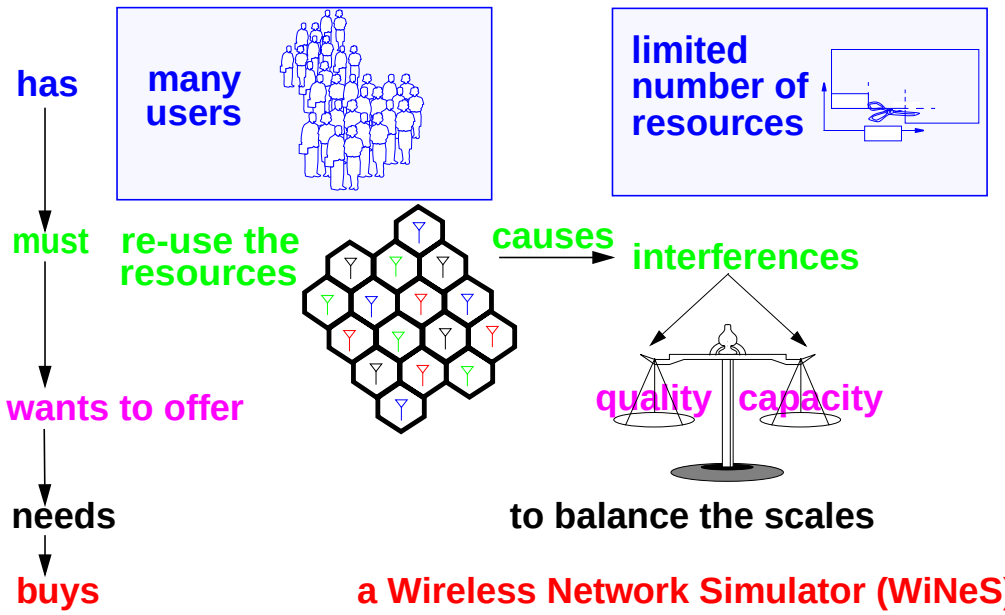
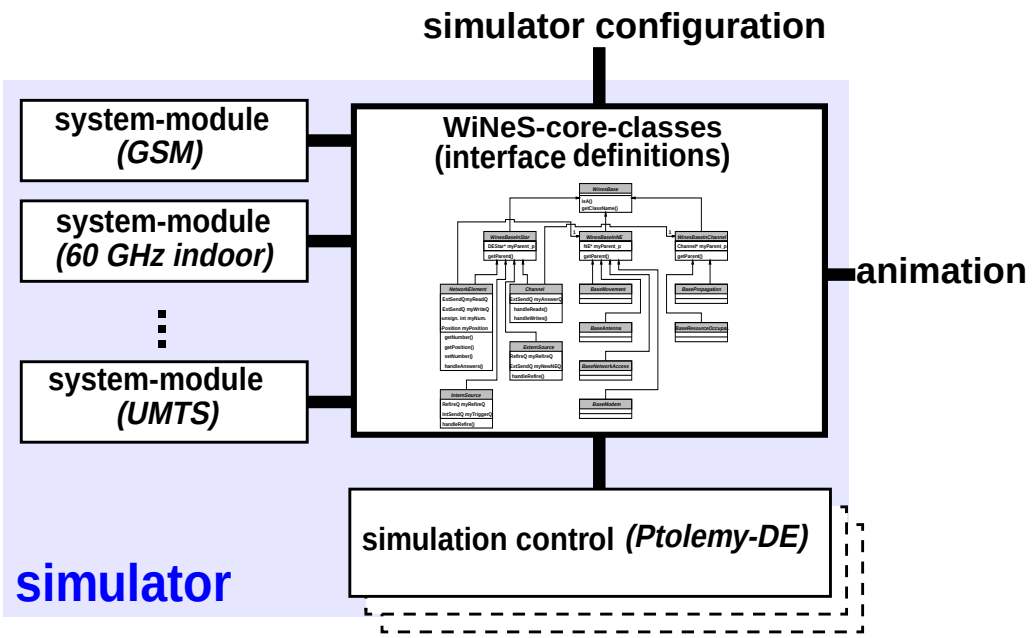
1. **Motivation: System Simulations of Mobile Cellular Networks**
2. **Wireless Network Simulator: Overview**
3. **Choosing a Model of Computation: Specifics of Mobile Cellular**
4. **Application: Simulation of a 60 GHz Indoor System**

System Simulations for Mobile Cellular Networks

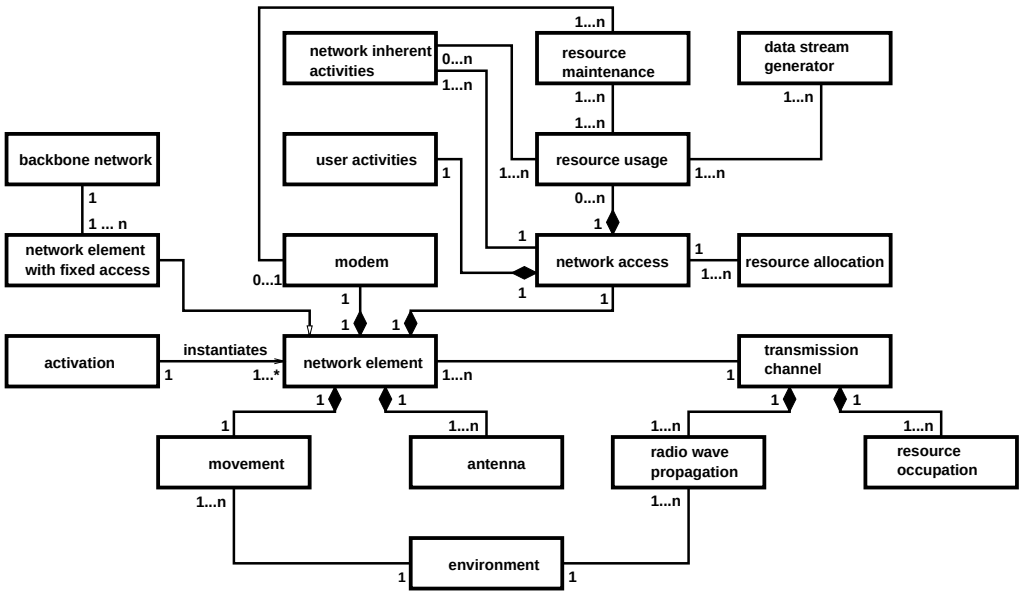
a network operator...



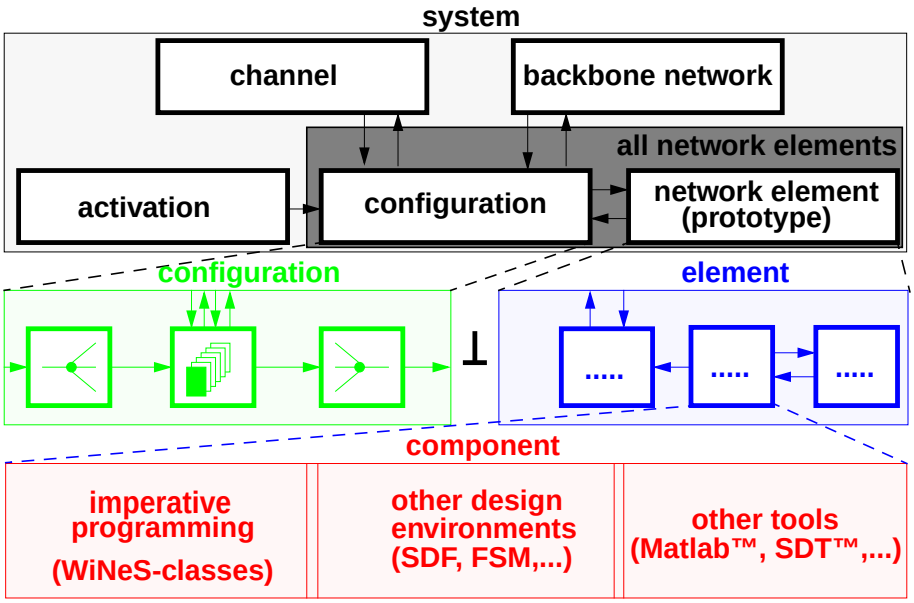
Wireless Network Simulator (1) *Overview*



Wireless Network Simulator (2) Object-Oriented Analysis

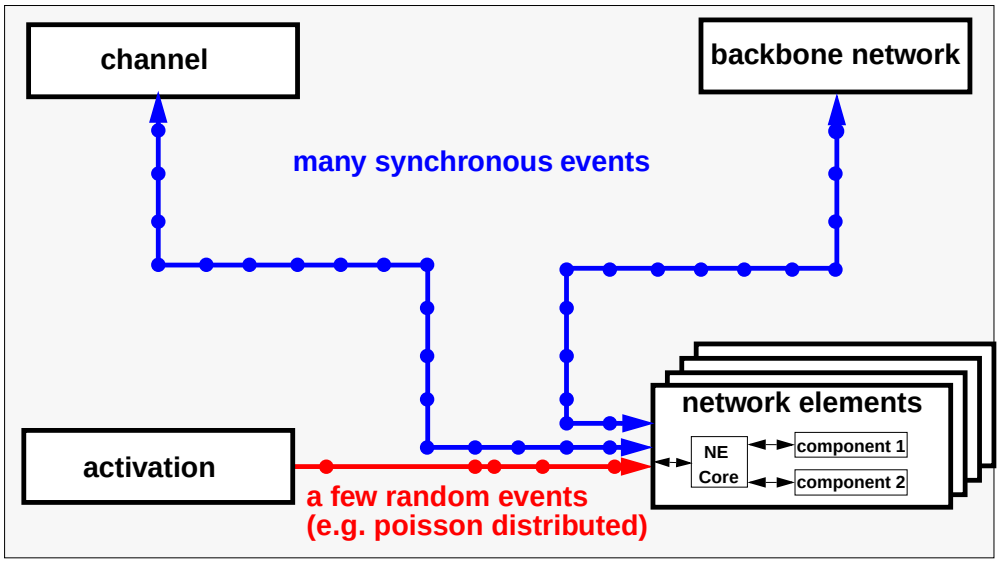


Model of Computation (1) *Multiple Layer Model*



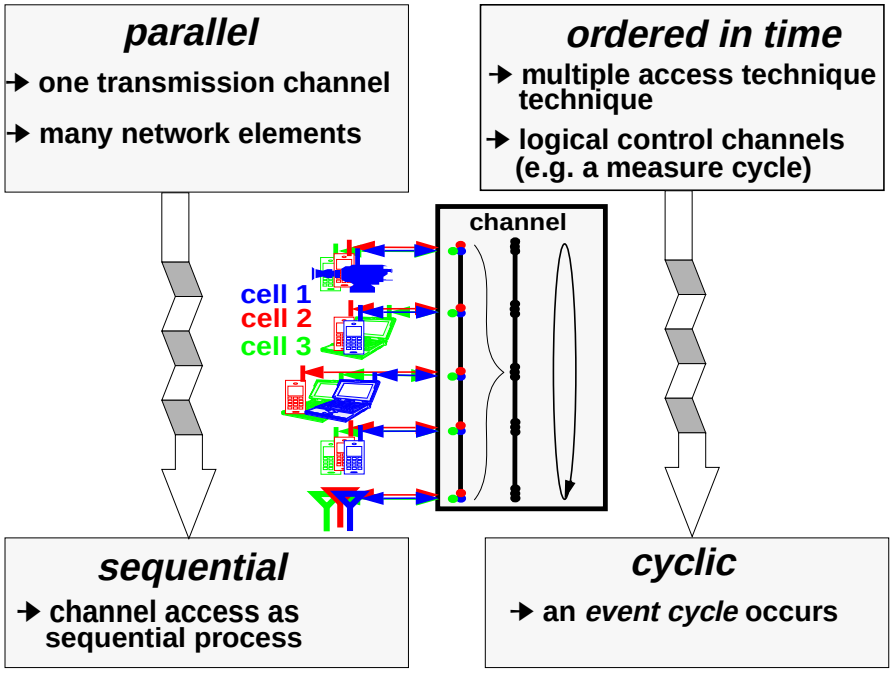
Model of Computation can be different in each layer

Model of Computation (2) *Events on System Layer*

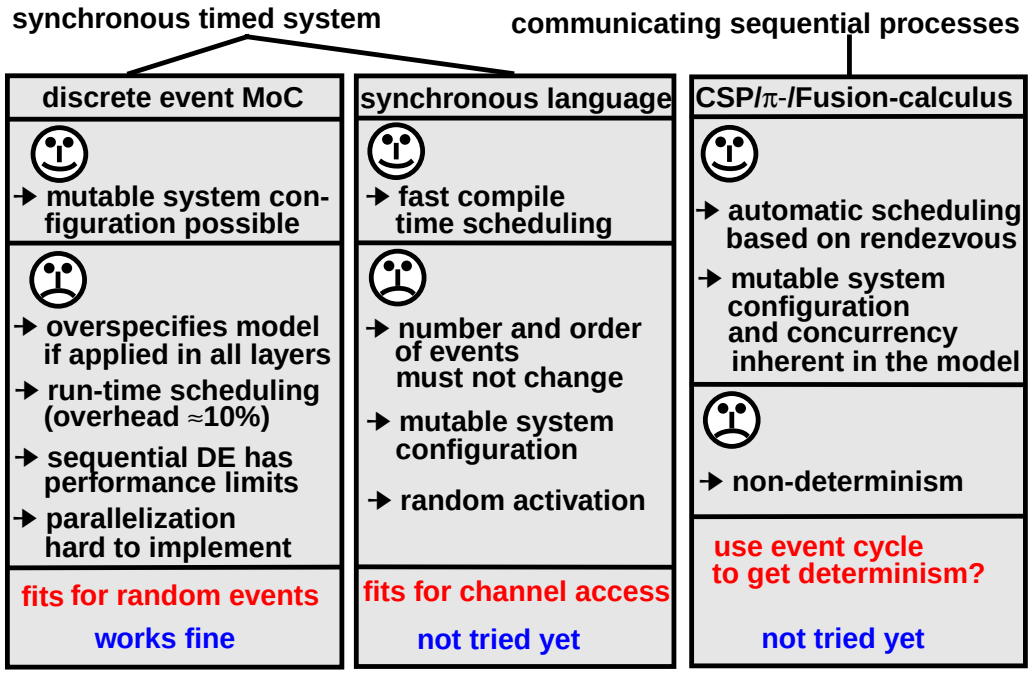


event-tags need not to be totally ordered through all layers

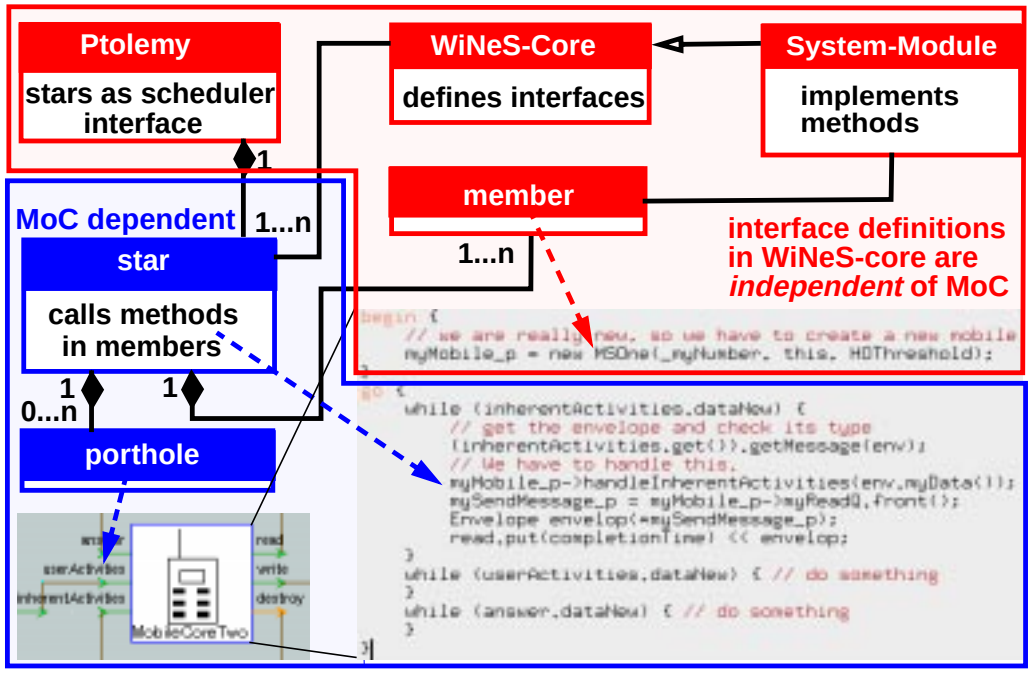
Model of Computation (3) — Channel Access



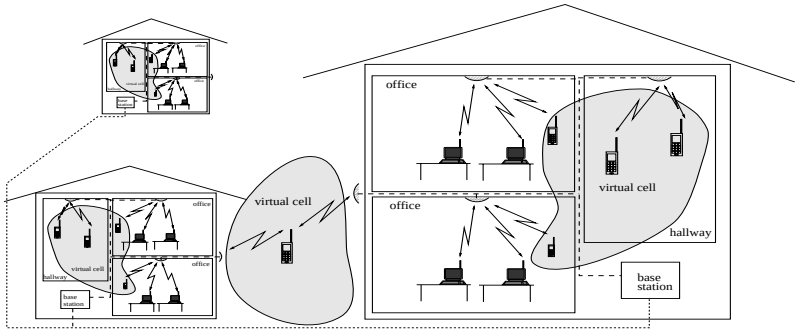
Model of Computation (4) — Alternatives



Connection between Ptolemy and System-Modules

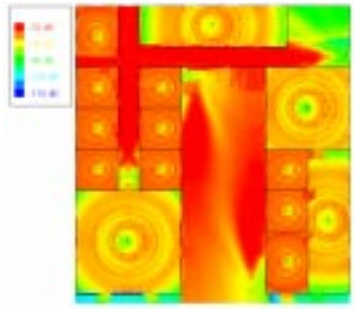


Application: 60 GHz System Module



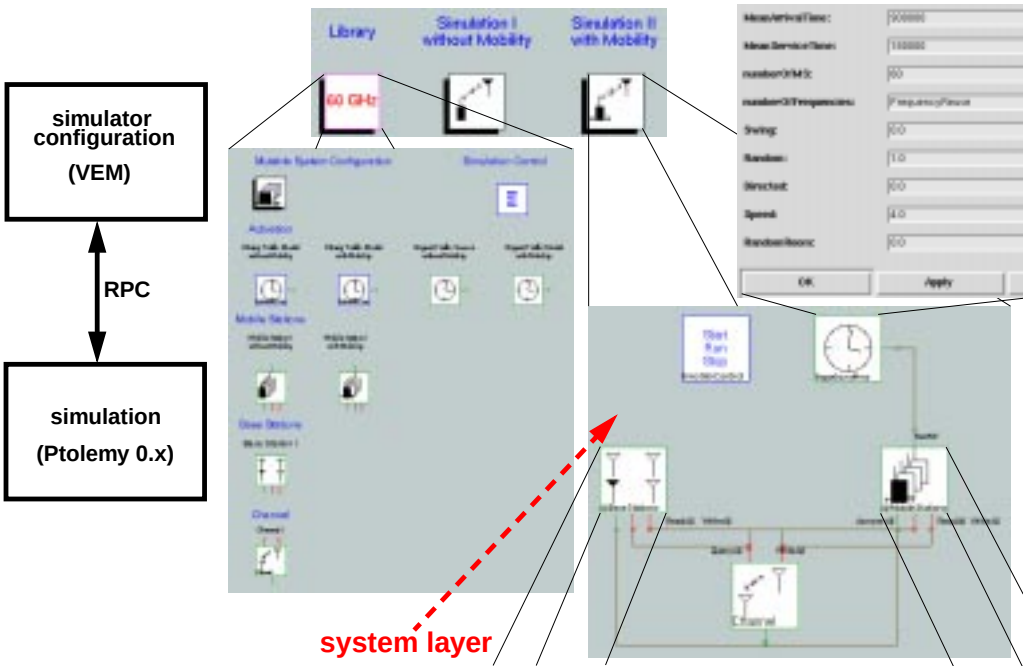
research project:

campus network @ 60 GHz

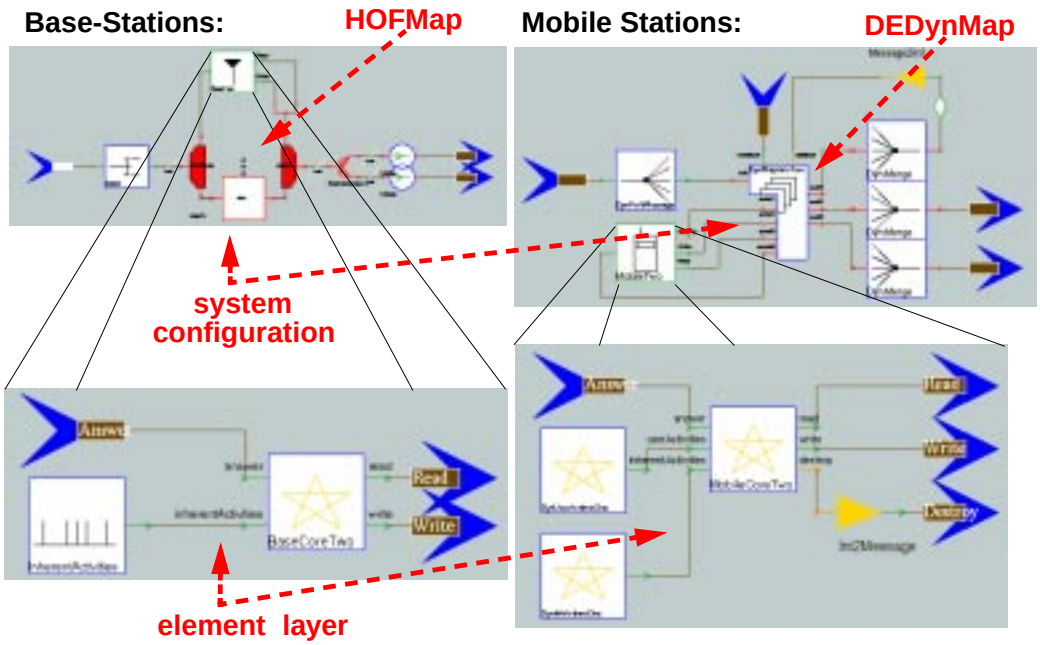


- ✔ each room == one cell
- ✔ system simulations in Generic Office Environment
- ✔ radiowave prediction by incorporated on-line Radiowave Propagation Simulator (RPS)
- ✔ different activation and mobility models

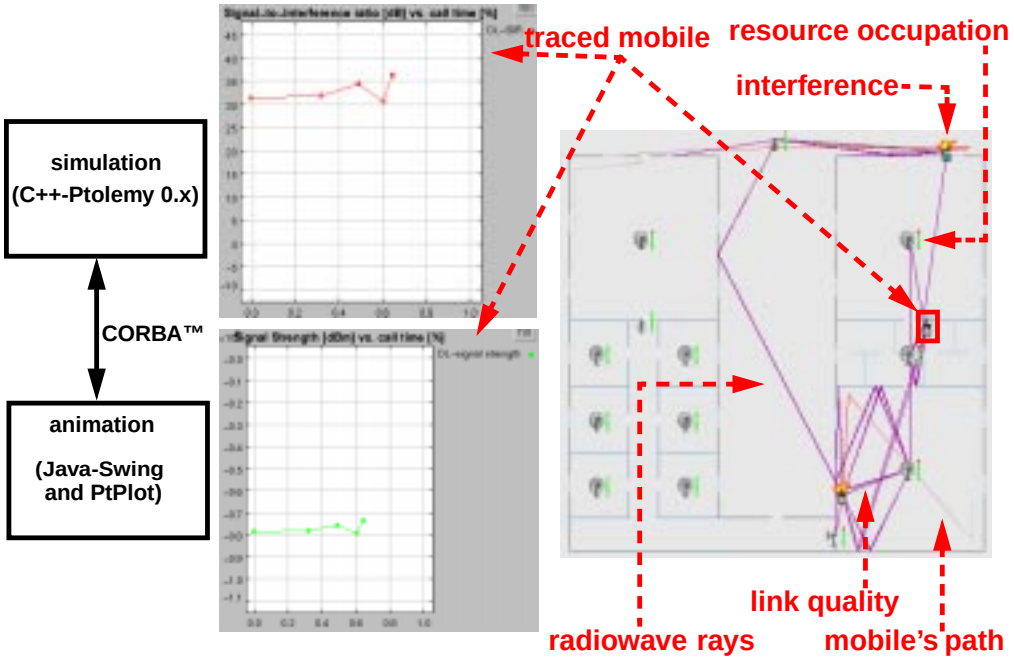
60 GHz System Module (1) — Layout



60 GHz System Module (2) — System Configuration



60 GHz System Module (3) On-line Animation and Trace



Summary and Future Work

- **heterogeneous approach in three senses:**
  - different mobile cellular systems are modeled in different system modules
  - use of a Multiple Layer Model allows for a different MoC in each model layer
  - Event-Cycle for channel access allows for different MoC on system layer and simplifies parallelization
- **ready to use:**
  - two system modules (GSM and 60 GHz indoor)
  - simulation control: Ptolemy 0.7.1 - Discrete-Event Domain
  - on-line animation written in Java™ and connected via CORBA™
  - simulator configuration via Ptolemy0.x-GUI
- **plans:**
  - simulation control which allows for concurrency (first choice: base on PtolemyII - CSP / PI)
  - more generic GUI for animation/configuration (use of DIVA system visualization?)
  - new system modules: 3G-UMTS, 4G-research project (IBMS)