# EU FP7 STREP SOCRATES

Self-Optimisation and self-ConfiguRATion in WirelEss networkS

## Load Balancing (LB)


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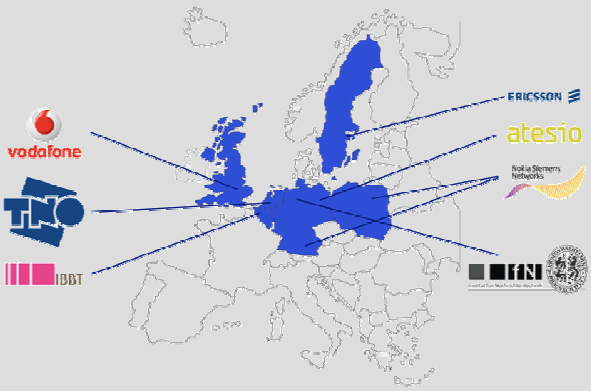


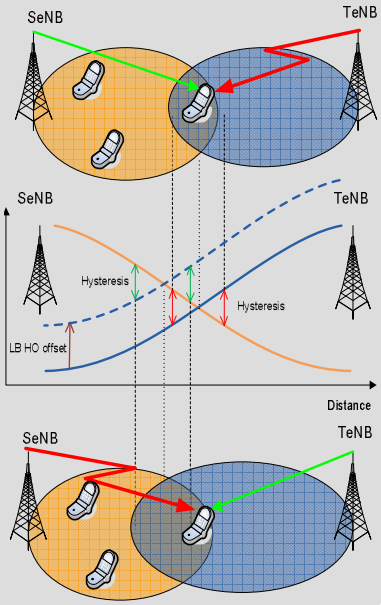

## Use Case Goals and Approach

***Goal:*** Reallocate part of users from overloaded serving cell (SeNB) to less loaded neighbouring cells:

- Equal users distribution
- Free resources at SeNB
- Improve QoS at SeNB

***Approach:*** Add virtual HO offset to real measurements of target eNB (TeNB):

- TeNB increase overlapped area
- Force users to HO to TeNB at SeNB cell edge




## Simulator / Demonstrator Setup

**Setup:**

- Three network layouts: homogenous, non – homogenous, realistic (Braunschweig area)
- Constant bitrate traffic model
- Throughput and load calculation base on Shannon bound formula
- Background and moving Hot Spot users simulated

**Snapshots:**

- Users position updated each snapshot
- Load estimation for group HO
- Base on available load reports and estimated load, best HO offsets to neighbour cells are adjusted in real time

## Results

**Virtual load**

- Sum of the required resources N of all users u connected to cell c

$$\hat{\rho}_c = \frac{1}{M_{PRB}} \cdot \sum_{u|X(u)=c} N_u$$

- All users in a cell are satisfied as long as $\hat{\rho}_c \leq 1$
- LB algorithm operate on virtual load thresholds

**Unsatisfied users due to resources limitation**

- Load Balancing performance is evaluated by 'z' metric (number of unsatisfied users)

$$z = \sum_{\forall c} \max\left(0, M_c \cdot \left(1 - \frac{1}{\hat{\rho}_c}\right)\right)$$

- Number of users in cell *c* is represented by *Mc.*

## Demonstrator – what is shown