



**WHERE2**

**Wireless Hybrid Enhanced Mobile Radio Estimators – Phase 2**

[www.ict-where2.eu](http://www.ict-where2.eu)

## The WHERE2 Project - Outline

- Factsheet
- Partners
- Objectives of WHERE2:
  - Enhancing Positioning features by communication networks and non-radio sensors
  - Improving Communications by geo-location information
  - Trials of a cooperative heterogeneous network to show both
- Exploitation Plans

## Where2 - Factsheet

- Where2 – phase 2 and successor of the FP7 Where project:
  - **Cooperative mobile radio communications**
  - **Cooperative positioning**
- FP7 – 4<sup>th</sup> call EU Project:
  - Type: STREP
  - Duration: 36 Months (- 6/2013)
  - Volume: 674 PMs, Funding: 5.257 M€
- Contact – project coordination:
  - Ronald Raulefs ([Ronald.Raulefs@dlr.de](mailto:Ronald.Raulefs@dlr.de))
  - Armin Damman ([Armin.Dammann@dlr.de](mailto:Armin.Dammann@dlr.de))

## Partnership: 16 Partners, 9 Countries

### Industrial Partners:

- Mitsubishi Electric ITE (F)
- MTN Cyprus (CY)
- Telefonica I+D (E)

### SME:

- ACORDE (E)
- Sigint Solutions (CY)
- SIRADEL (F)

### Universities:

- Aalborg University (DK)
- University of Surrey (UK)
- Université de Rennes 1 (F)
- Instituto Telecomunicações (P)
- Universidad Politecnica de Madrid (E)

### R&D Centres:

- Commissariat à L'Énergie Atomique – LETI (F)
- German Aerospace Center (D)
- Eurécom (F)

### Outer Europe Partners:

- TRILabs from Edmonton (CDN)
- City University of Hong Kong (CN)



## Key Objectives of Where2

- Improving Positioning:
  - Enable **indoor** terminal location with an accuracy at least **equivalent to that of outdoor GPS**, by combining & extending **distributed techniques** into the new dynamic heterogeneous and cooperative scenario
- Improving Communications:
  - **Quantify geo-location-based cooperation gain** in wireless communications in terms of throughput, reliability, power consumption, complexity and security.
- Realization:
  - Developing integrated hardware platform to **confirm performance and feasibility of cooperative positioning and communications algorithms by trials**

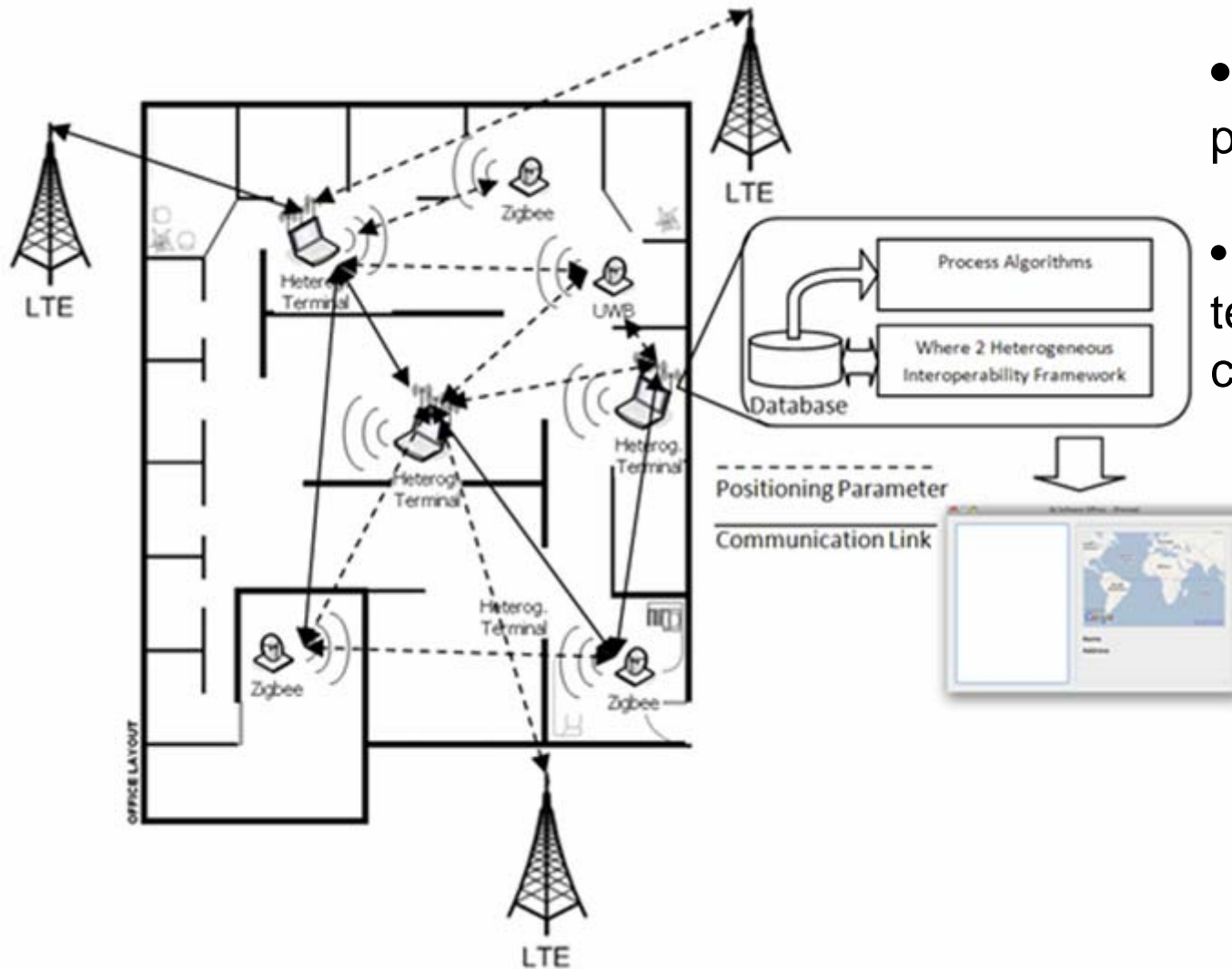
## Challenges for Positioning:

- **Aim at locating for free** from both communications and network topology perspectives (i.e. with limited overhead and reasonable embedded complexity, timely access to the fixed infrastructure)
- Make direct/indirect use of additional **inertial modalities** to complement radiolocation functionalities (e.g. in harmful propagation environments).
- Make location **latency compatible with location-based services** (e.g. refreshment rate of positional information required by location-aided communications)
- Develop self-learning techniques to provide **new context-awareness features** (e.g. inferred layout or radio maps), which could be exploited by future autonomous and adaptive networks

## Challenges for Geo-Location aided Communications

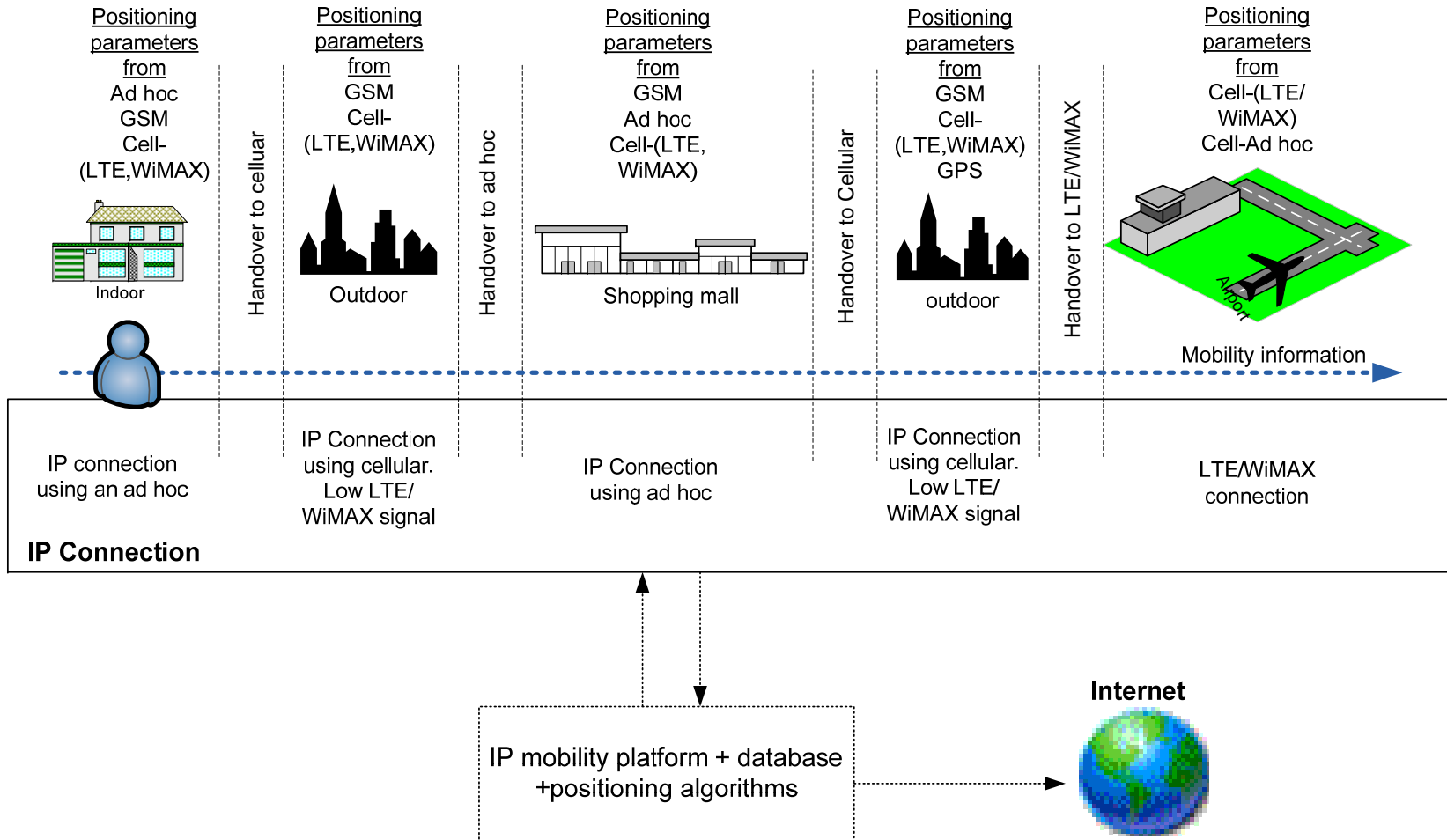
- Enhance **multilink channel models** for both **communications and positioning** needs
- Improved **coordination** and **cooperation** between **cell sites**:
  - reduced signalling overhead,
  - including **cooperation** between **femto** and **macro cells**
- Improve **reliable, secure** and **trustworthy** methods for **cluster management and relaying**
- Offer reliable and efficient PHY/MAC layer design for **advanced cognitive radio** techniques through **exploitation of location information** and **user cooperation**.

## WHERE2 Hardware Test Environment



- Cooperative positioning trials
- 1<sup>st</sup> heterogeneous test-bed for cooperative positioning

# Trials: Story of Geo-Location aided Communications (V-handover)



## Cooperations, Standardization, Exploitation

- Concertation and Cluster:
  - Continuation within the RAS cluster
- EU projects:
  - Liaisons with ongoing and recently started projects
  - Jointly organizing workshops
  - Projects that require **positioning** or **context information**:
    - CogEU, Qosmos, ...?
  - Projects that require **accurate synchronization** in **heterogeneous networks**
- Exploitation:
  - Publish frequently “out-of-the-lab-letters”
  - Operators (TID, MTN)
- Standardization:
  - 3GPP LTE, OMA (SUPL 3.0)