

# BeFEMTO

Broadband evolved **FEMTO** Networks

Call FP7-ICT-2009-4

Proposal No: 248523

## BeFEMTO Overview

Frank Zdarsky (NEC)

FP7 Concertation Meeting, 2010-01-27

- ❑ Synopsis & Overall Objectives
- ❑ Project Organization
- ❑ Proofs of Concepts

# 1 – Synopsis & Overall Objectives



- ❑ **Duration:** Jan. 2010 – Jun. 2012 (30 Months)
- ❑ **Consortium:** 12
  - ❑ Countries: 6
  - ❑ Industrial (Operator): DOCOMO, PTC, TID
  - ❑ Industrial (Manufacturer): NEC, SC, QC
  - ❑ SME: TTI, mimoOn
  - ❑ Research Centres: CTTC, CEA
  - ❑ Higher Education: UOULU, UNIS
- ❑ **Advisory Board:** 6
  - ❑ S. Saunders (Femto Forum), W. Webb (Ofcom), U. Mulligan (ETSI), M. Busilo (UKE), J. P. Kermoal (ECO), B. Espinosa (ANFR)
- ❑ **Total Budget:** 10.2 M€
- ❑ **EC funding:** 6.9 M€

## ❑ Overall Goal

To research & develop evolved LTE-A based **femtocell technologies** that accelerate **cost-effective** provision of **ubiquitous broadband** services by convergence b/w **fixed** and **wireless** broadband

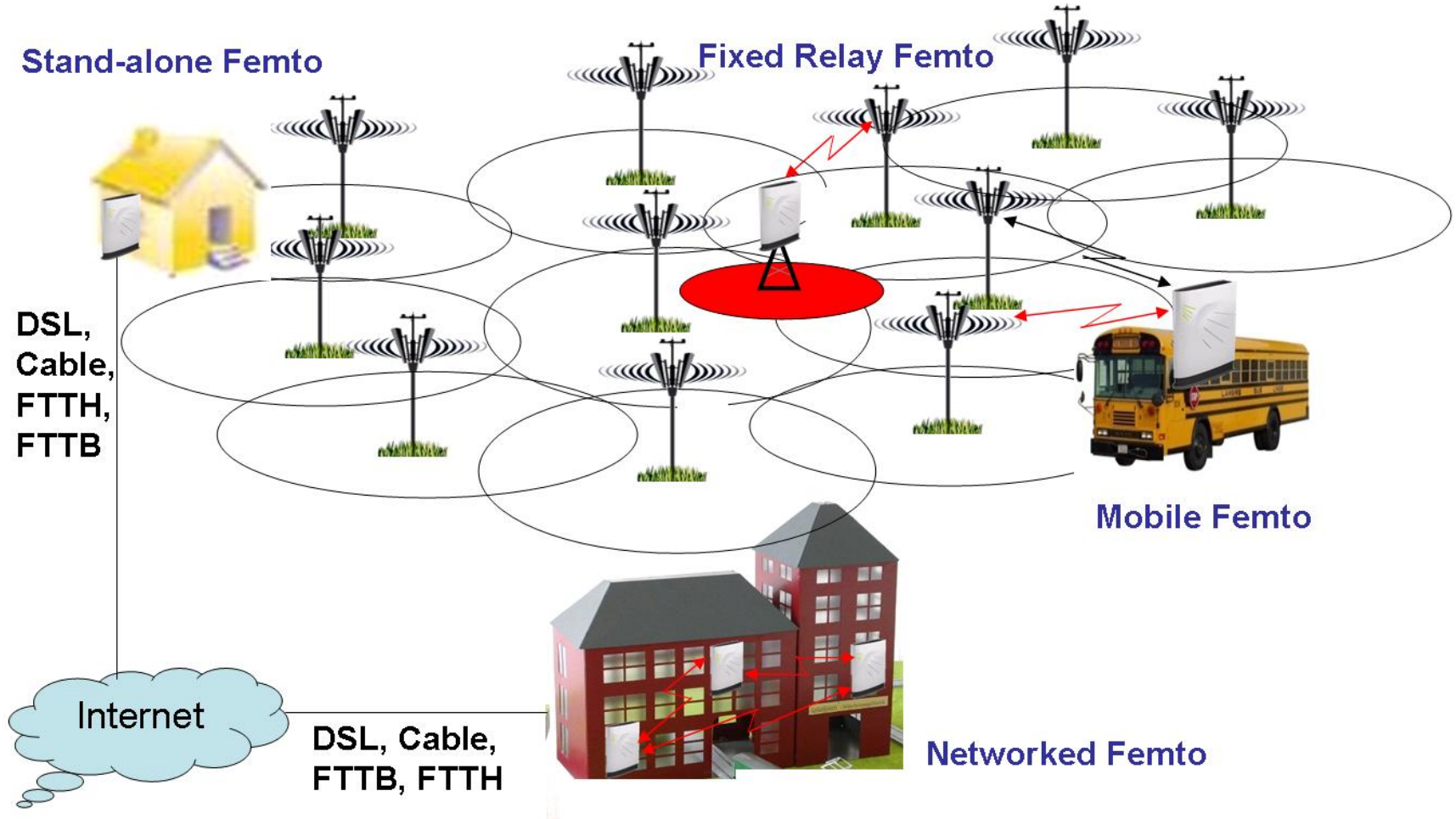
## ❑ Approach

- ❑ **Near-term solutions:** Novel techniques for **standalone femtocells** for early deployment
- ❑ **Long-term solutions:** Novel concepts of **networked femtocells**, **fixed outdoor relay femtocells** for enhancing cell-edge capacity, and **mobile femtocells** in public transport, all with **SON** capabilities for minimising OPEX and simplifying remote network management
- ❑ **Validation:** Through **2 experimental testbeds**, mathematical analysis, and simulation tools

## ❑ Objectives

- ❑ High Spectral Efficiency: **8 bits/s/Hz/cell**
- ❑ Maximum Mean Transmit Power: **10 mW**
- ❑ Support **infrastructure and spectrum sharing**
- ❑ Enabling **new services for home, enterprise and mobile** (transportation) environments.
- ❑ New and novel use of **femto technology in outdoor** environments

## Macro Cellular Network



- ❑ Truly Broadband Radio Access Technologies
- ❑ Major focus is on autonomously self-optimizing and self-managing femto

## Challenging working areas with potential for collaboration:

### **RF Signal Processing**

- efficient, low-cost power amplifiers, highly sensitive receivers, flexible channel bandwidth, reliable RF filters, ...

### **Interference Management**

- coping with unplanned rollouts, macro-femto-coordination, coverage estimation, interference cancellation, ...

### **Link and Access Management**

- handover, admission control, resource management (s.a. load balancing and flow control), ...

### **Network Management and Architecture**

- access control, authentication, local breakout, efficient forwarding, seamless mobility, zero-config, ...

### **Backhaul Issues**

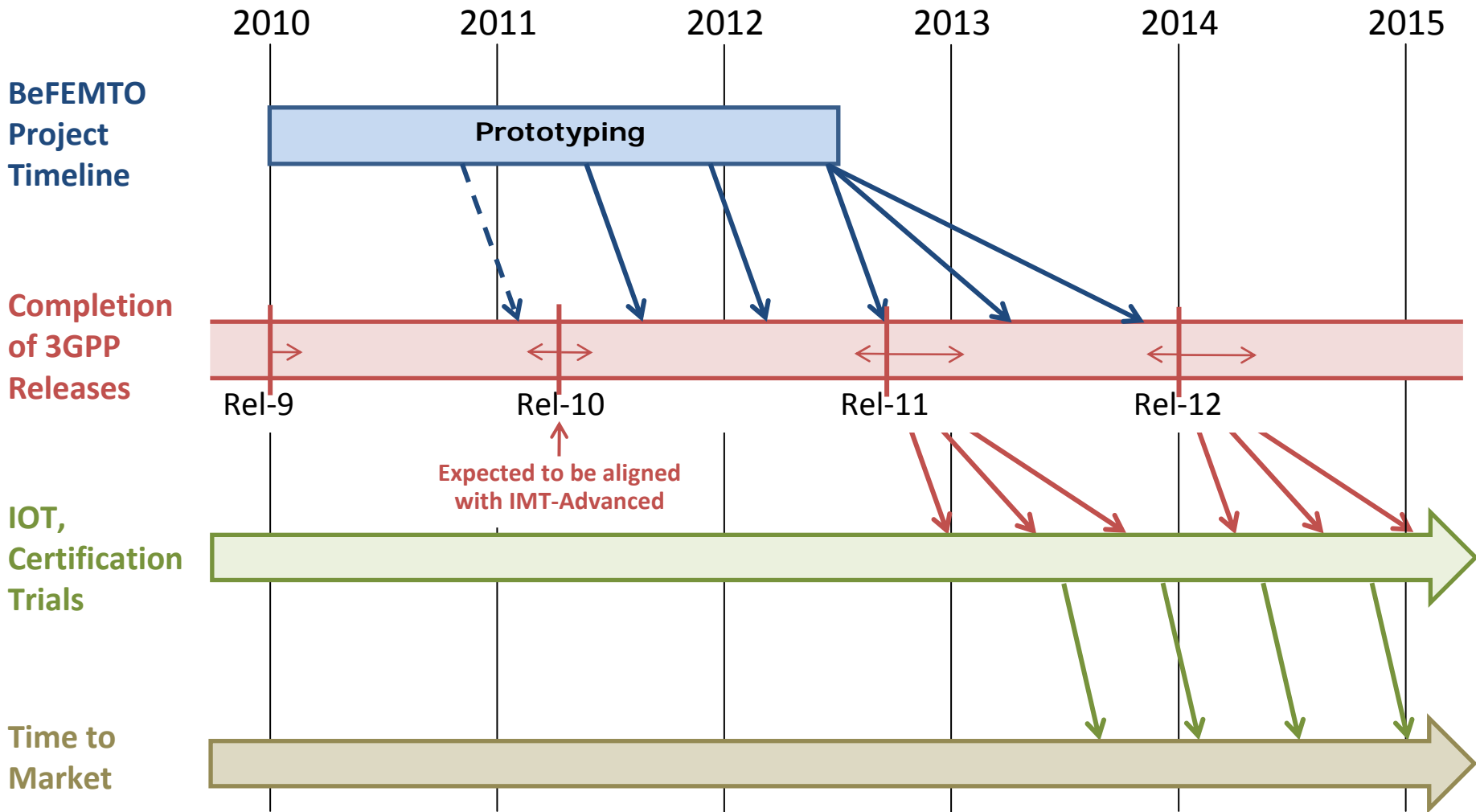
- wired or wireless backhaul, reducing signaling load, QoS provisioning and traffic prioritization, ...

### **Low Cost and Low Power Implementation**

- e.g. maintaining both coverage and capacity at very low transmit power

### **Dynamic Bandwidth Allocation and Sharing**

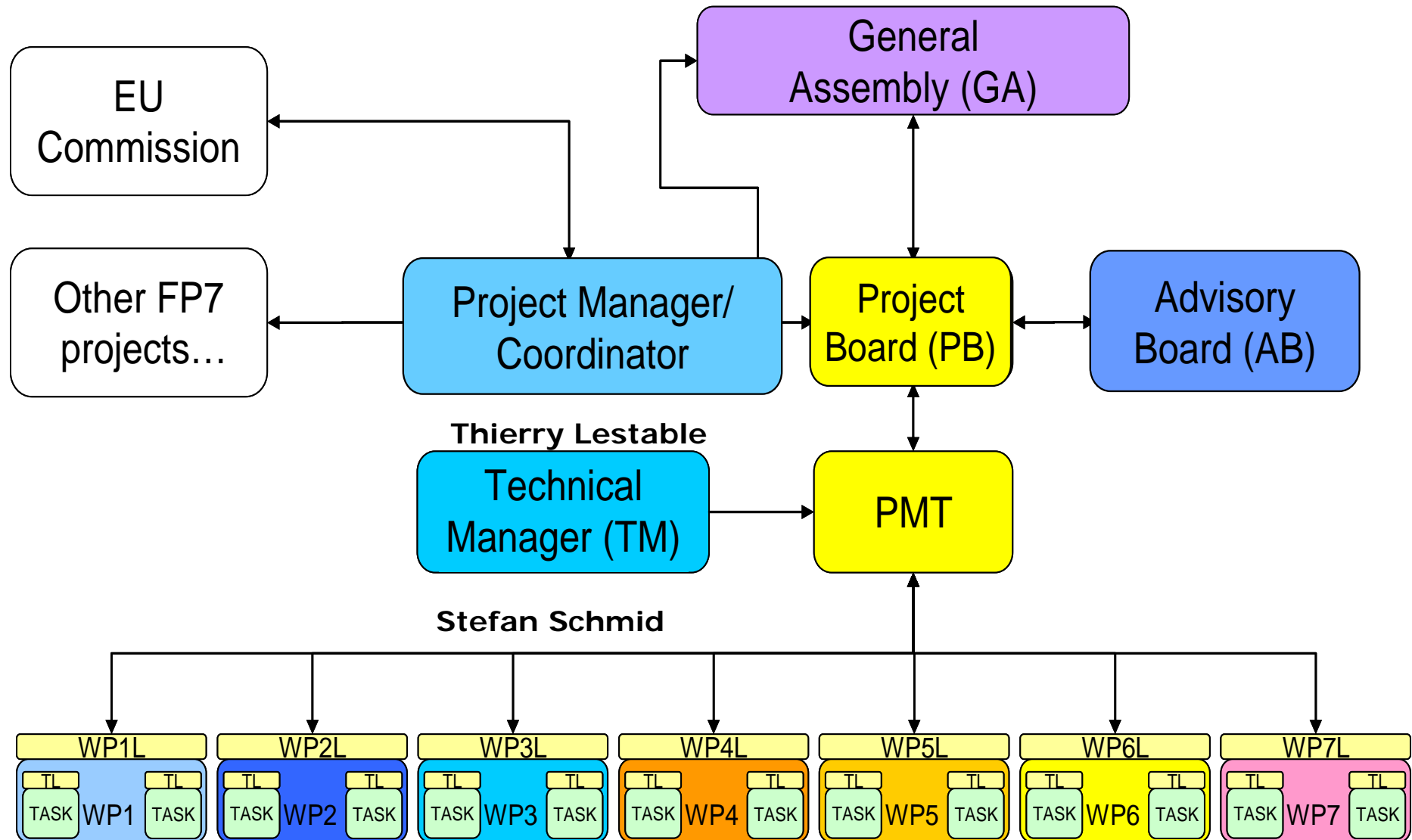
- multi-operator band sharing, flexible bandwidth allocation, backhaul sharing, ...



## Commitment to Standardization:

	3GPP	ETSI	Femto Forum	NGMN	Broadband Forum
DOCOMO	X	X	X	X	
QC	X		X		
NEC	X	X	X		X
SC	X	X	X		X
TID	X	X	X	X	X
PTC	X	X			
mimoOn			X	X	

# 2 – Project Organization



## Regulatory Organizations

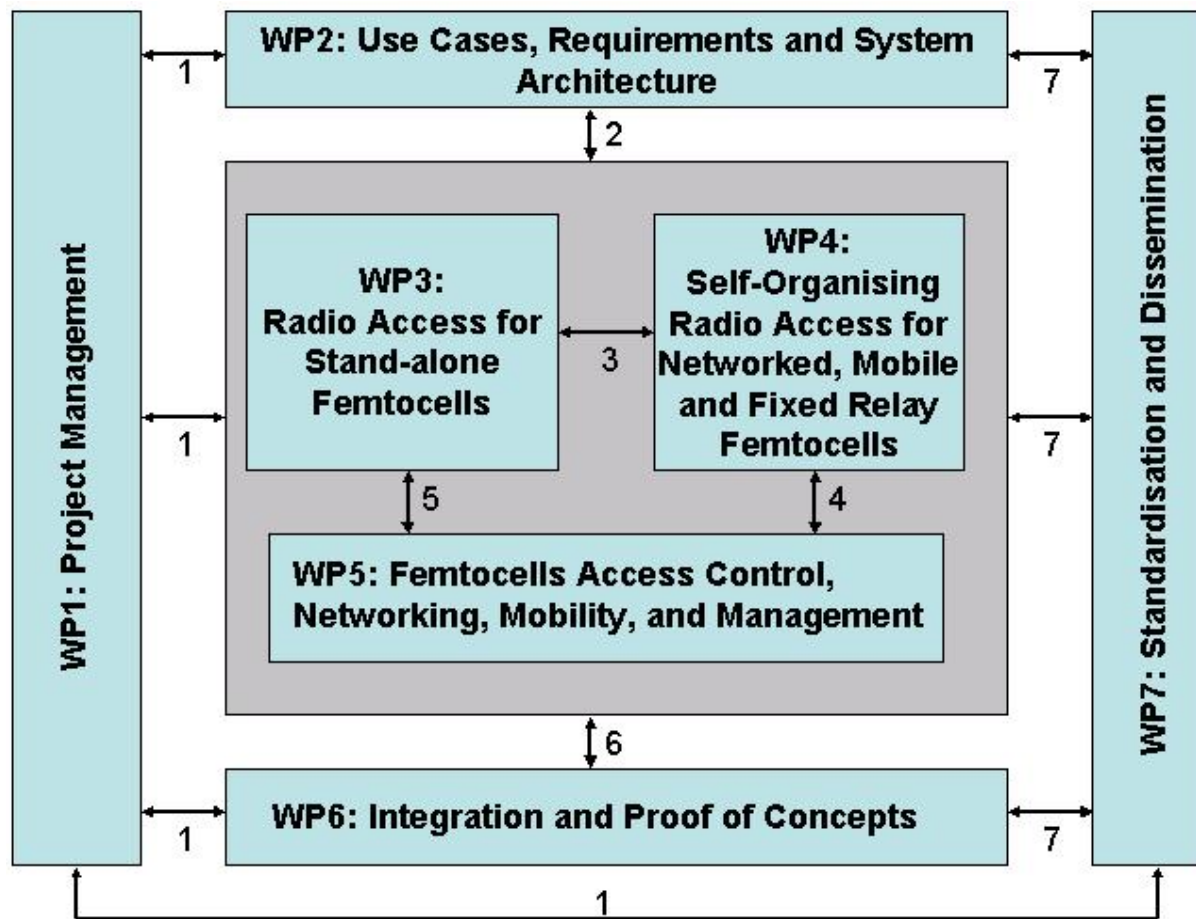
- ❑ **Ofcom (UK)**
  - ❑ *Prof. William Webb, Head of R&D*
- ❑ **UKE (PL)**
  - ❑ *Mariusz Busilo, Deputy Director*
- ❑ **ANFR (FR)**
  - ❑ *Bruno Espinosa, Head of Spectrum engineering*
- ❑ **ECO**
  - ❑ *Dr. Jean-Philippe Kermoal, Spectrum Manager*

## Industry Group

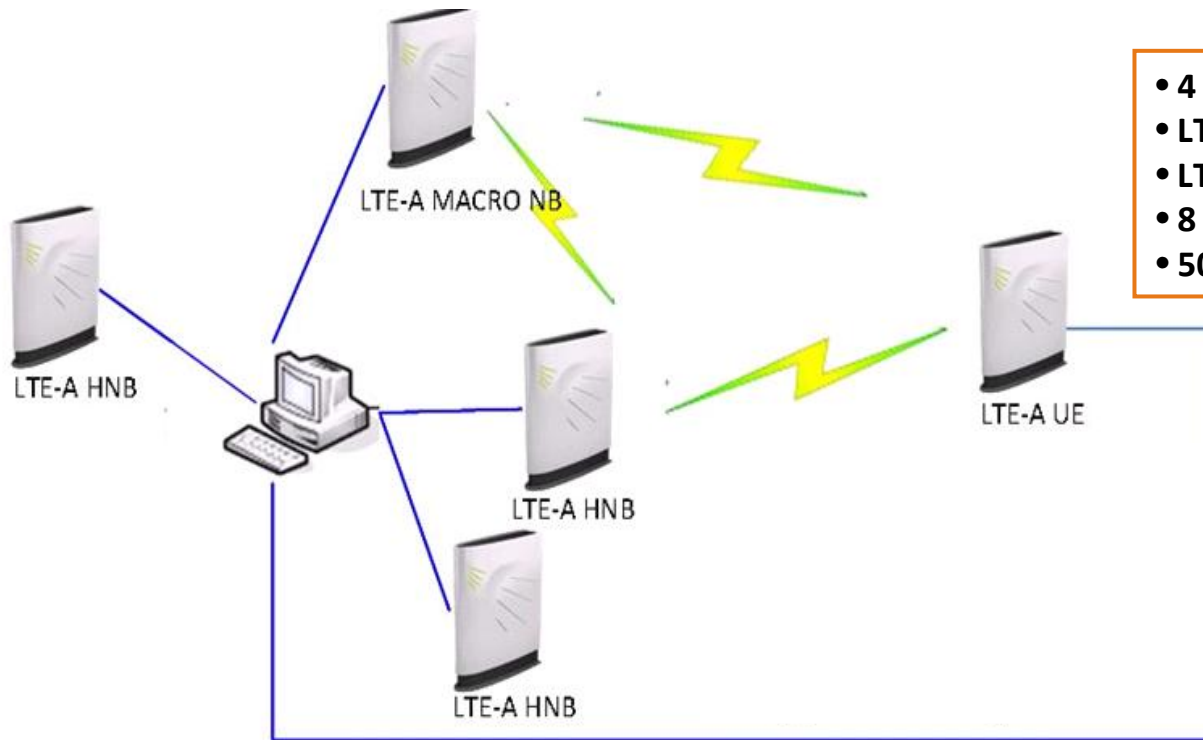
- ❑ **Femto Forum**
  - ❑ *Prof. Simon Saunders, Chairman of Femto Forum industry group & WG4 chair (Regulation)*

## European Standard Organization (ESO)

- ❑ **ETSI**
  - ❑ *Ultan Mulligan, Director of strategy & new initiatives*

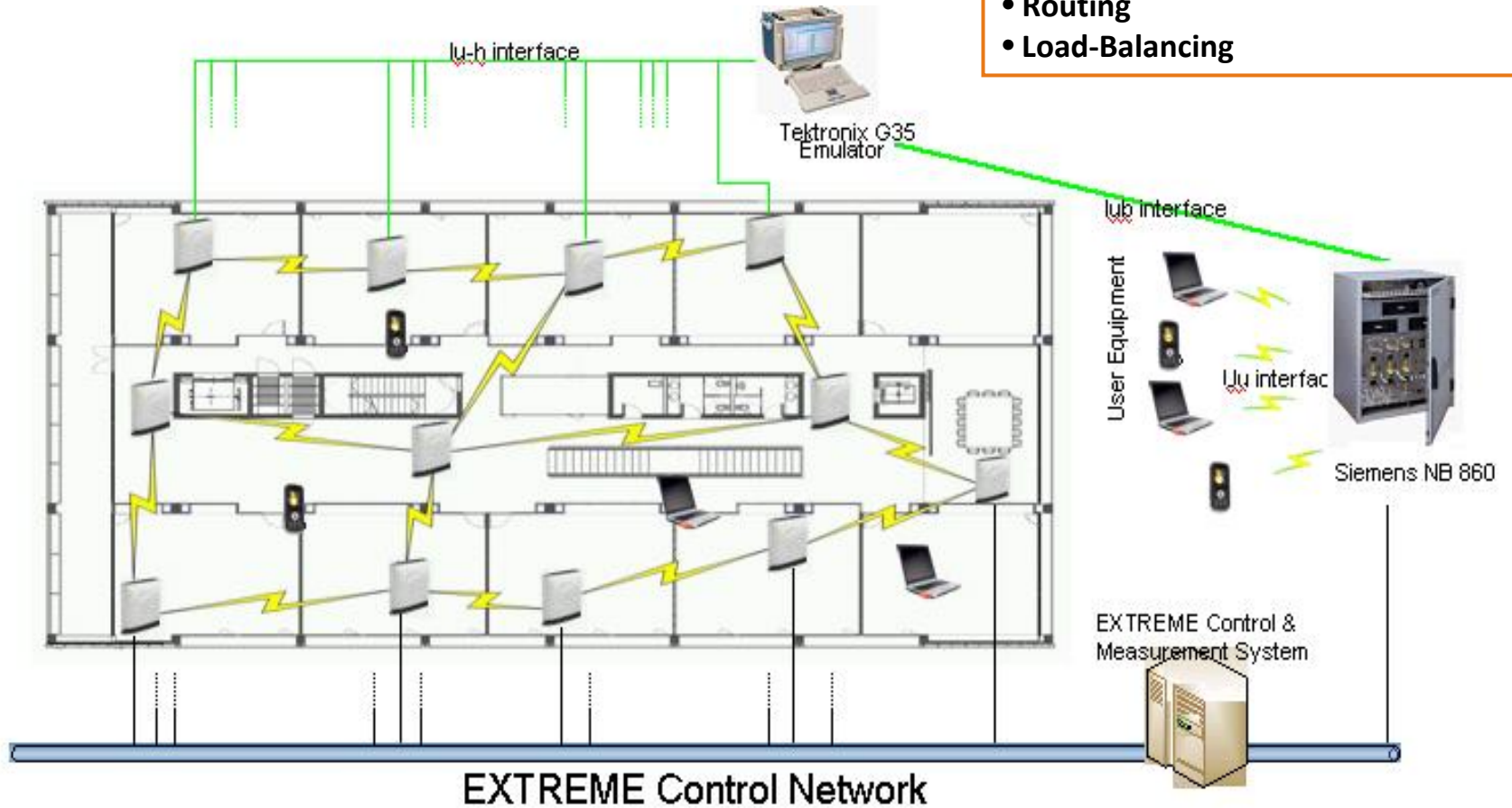


# 3 – Real World Proof of Concept



- 4 Antenna Spatial Processing
- LTE-A RF Frontend
- LTE-A PHY & Stack
- 8 b/s/Hz/cell spectrum efficiency
- 50 ppb network sync

- TR-069 Femto Data Model/SON
- lu-h
- RRM/Interference Management
- Routing
- Load-Balancing



Many thanks for your attention!!...

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