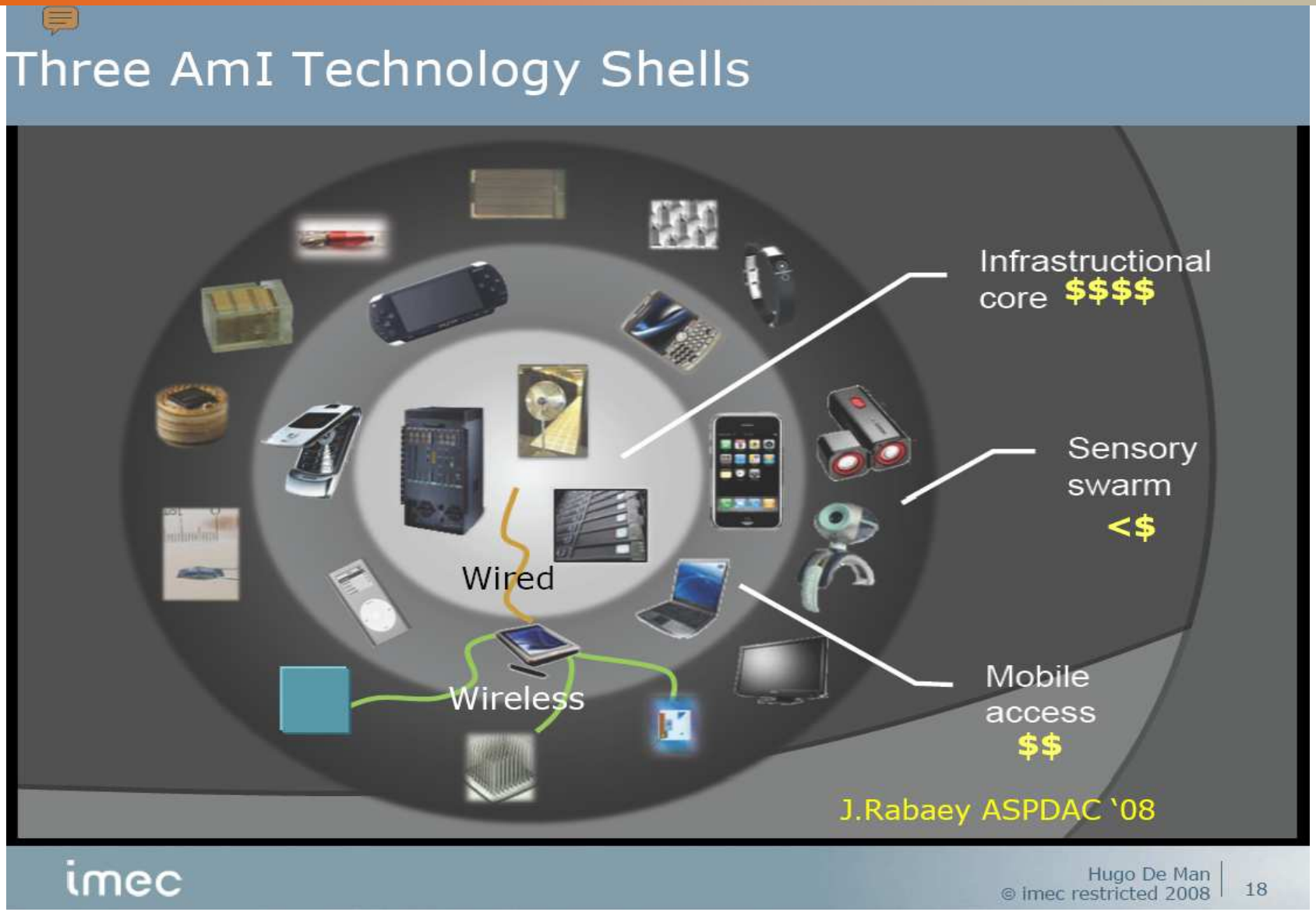
Essensium's Track & Trace Technology

Feb 5, 2009

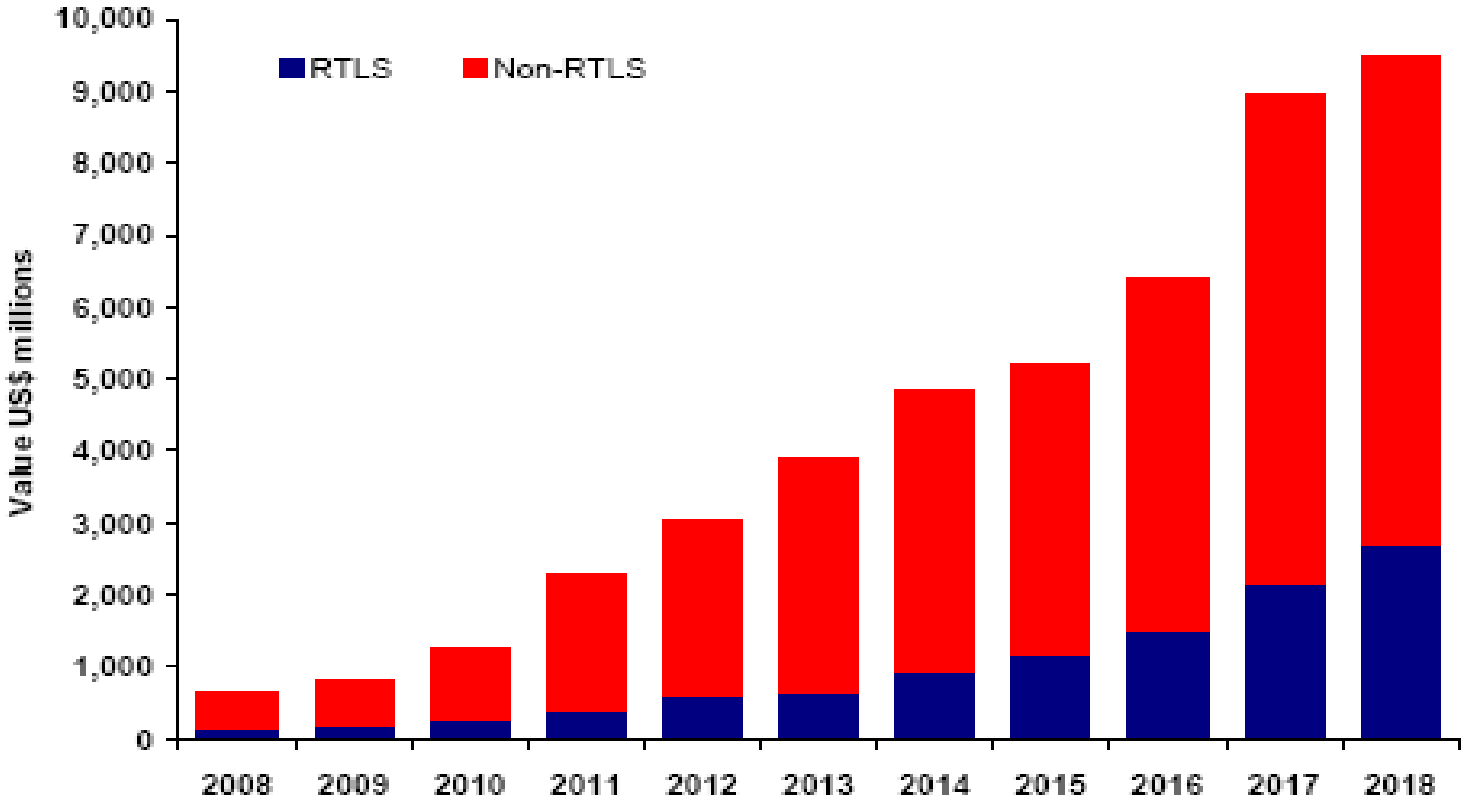
J. Danneels

AmI (Ambient Intelligence) in the internet of things

Where do we fit in the bigger picture! In $ & $$



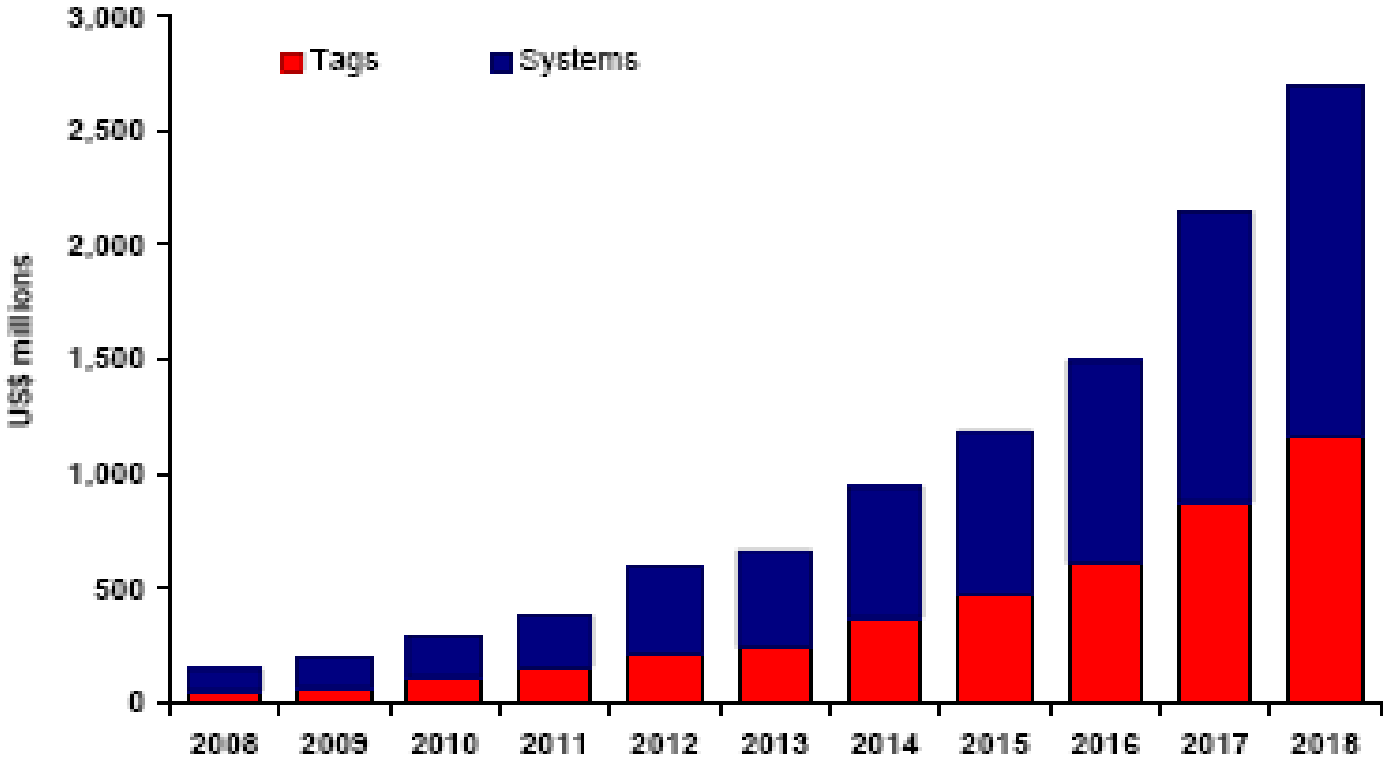
Total market for active RFID tags including systems



Source IDTechEx

RTLS: Real Time Location Systems

Forecast of global RTLS market



Source IDTechEx

Our vision on logistics

In the future all assets and inventory worth managing will:

- identify themselves
- send data about themselves
- connect to information systems in real-time
- be locatable and tracked

License from Coronis

Own development

both need different technology

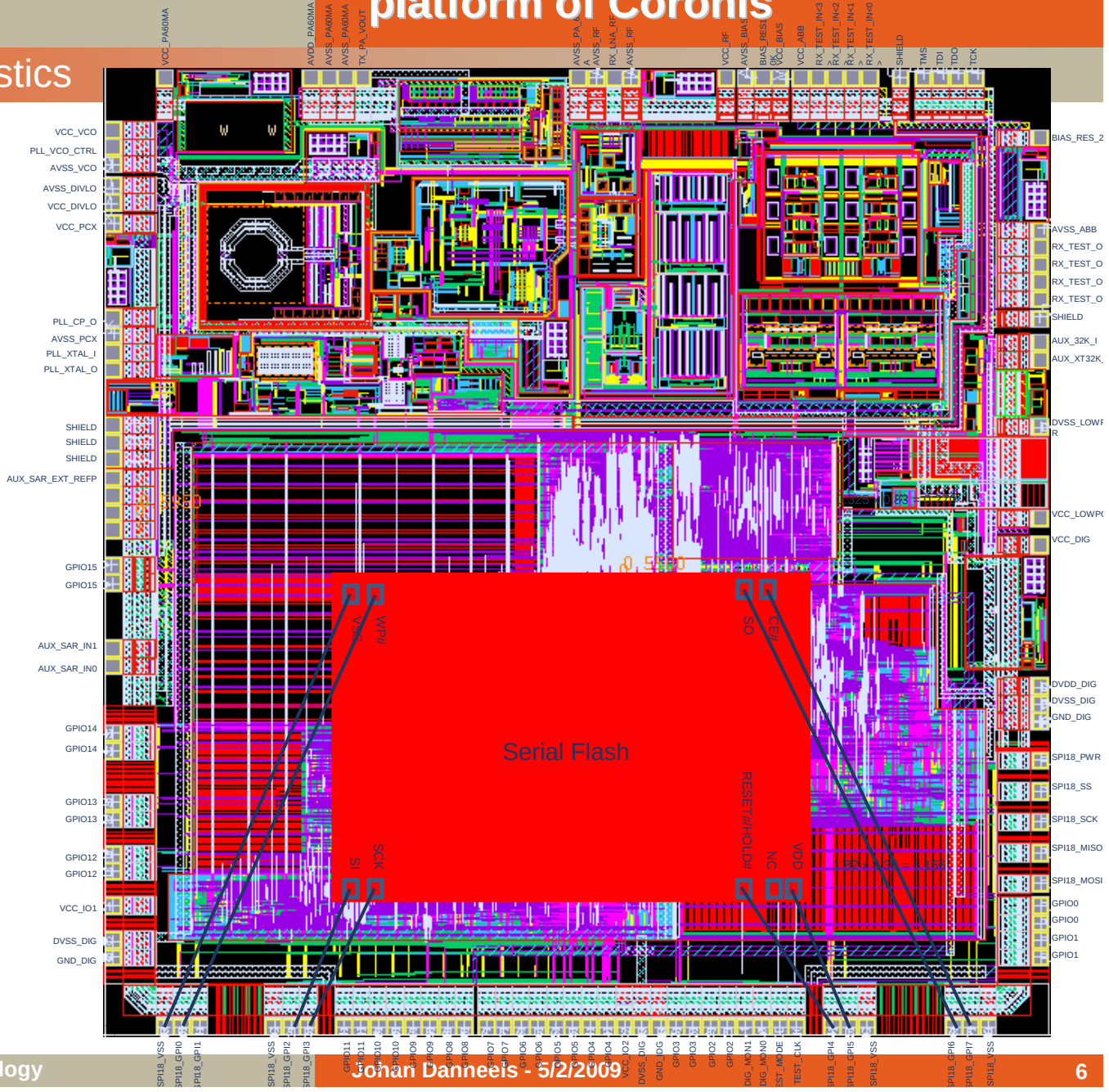
Narrowband : long range

Broadband : high accuracy

Essensium SOC for Wavenis platform of Coronis

Key SoC characteristics

- Full custom SOC
- Mixed signal
  - Full RF ISM band transceiver
  - 300K logic
  - 32bit processor platform
- Very low power for very long battery life
  - on: 40mW
  - off: 1µw
- 6 months from spec to GDS tape-out
- 2 months from GDS to first protos



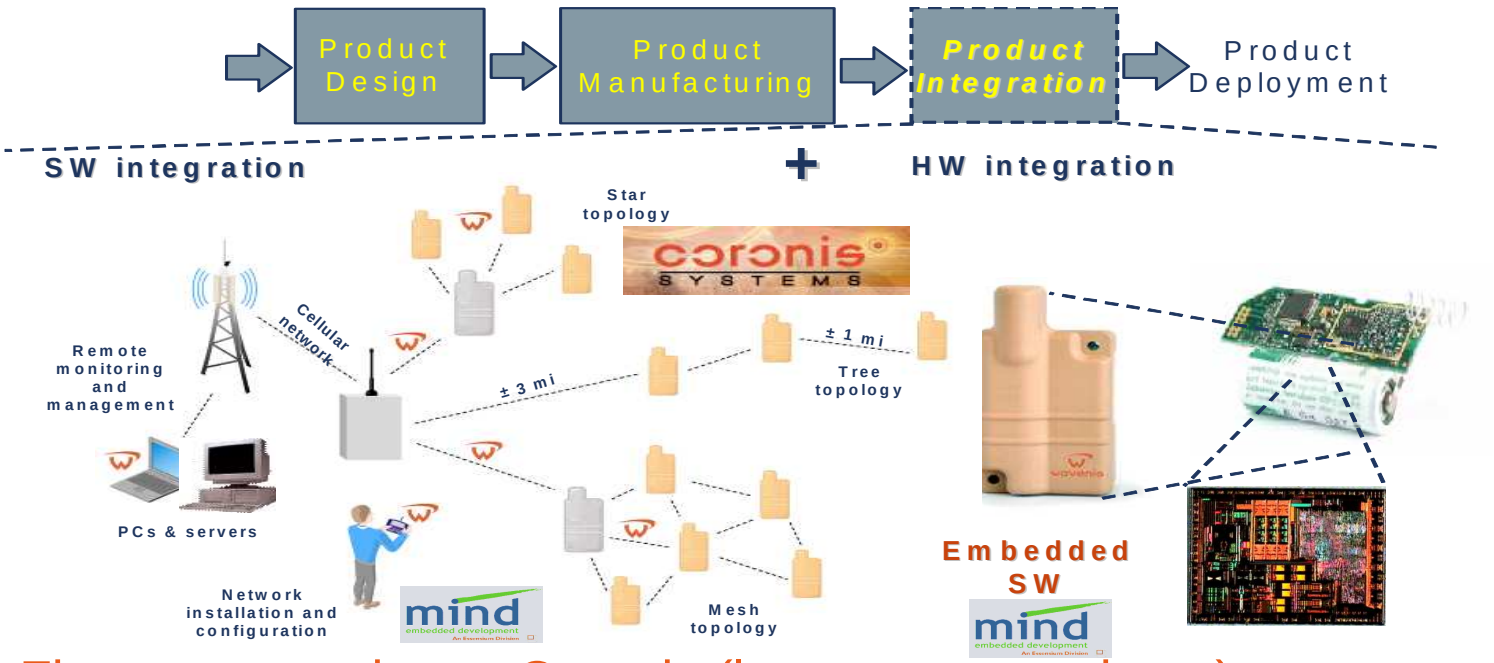
WSN fast track for non-RTLS

WAVENIS enabled products introduced by Coronis

With evolution based on a SOC ASIC made by Essensium

WSN fast track for non-RTLS

Besides technology, its all about integration to an end customer



- First customer base: Coronis (large customer base)
- Need for standardisation: Wavenis Open Standardization Alliance:
  amongst 17-, 6 founding members: Elster, Coronis, Essensium, Mesh Systems, Wavecom and France Telecom

PROTOCOL	Bluetooth	ZigBee	KNX	Z-Wave	I/OHome Control	
RF	802.15.1	802.15.4	KNX	Z-Wave	I/OHome Control	WAVENIS

Our vision on logistics

Essensium's own RTLS development

In the future all assets and inventory worth managing will:

- identify themselves
- send data about themselves
- connect to information systems in real-time
- be locatable and tracked

License from Coronis

Own development

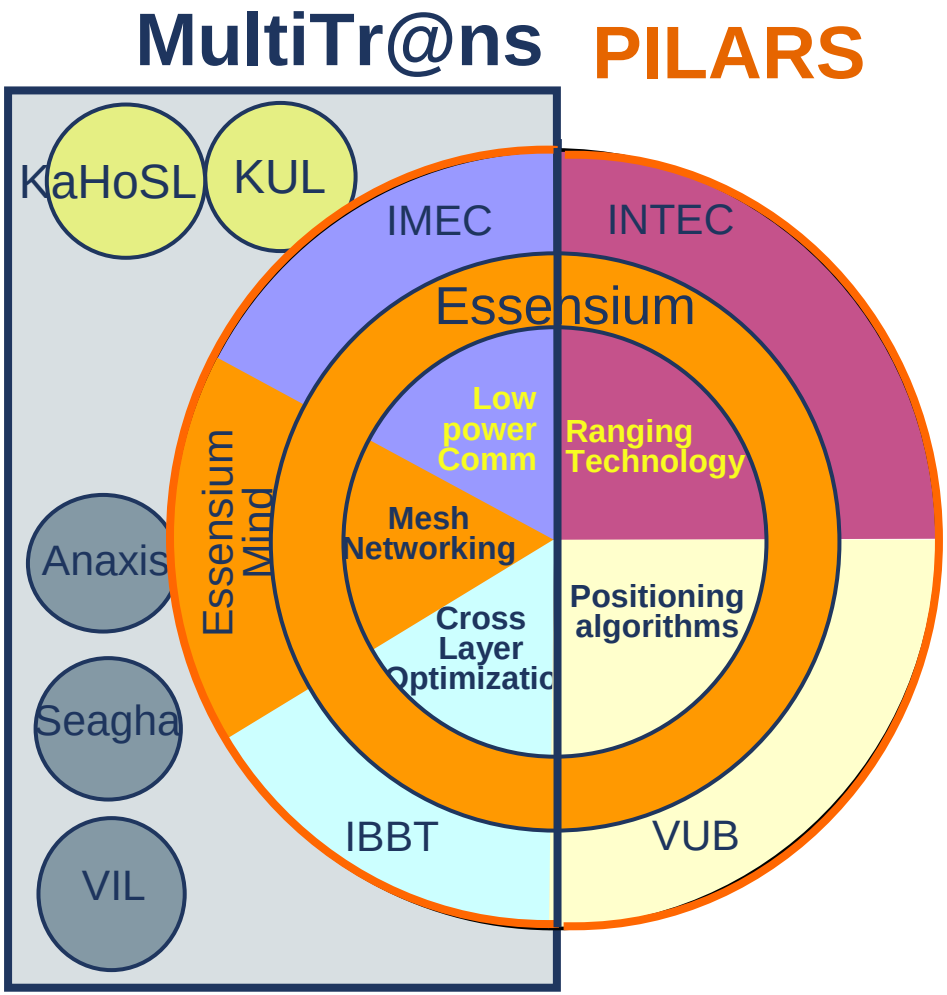
both need different technology

Narrowband : long range

Broadband : high accuracy

Our RTLS development plan

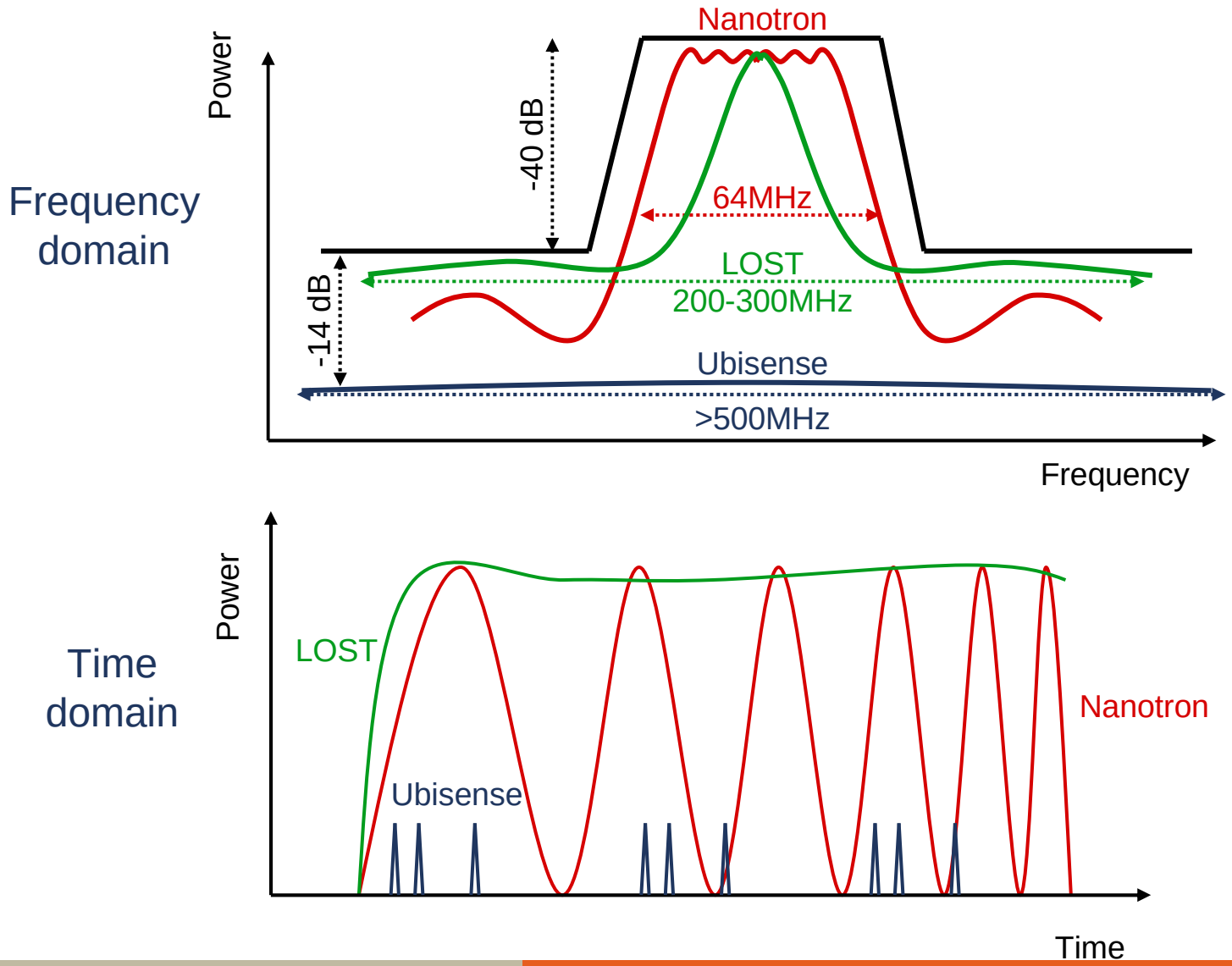
PILARS : a unique talent pooling for RTLS



- R&D program, funded by IWT
- 4 year 4MEuro program (2006 – 2010)
- In cooperation with major universities, competence centers and industry
- Covering different technological challenges :
  1. Ranging Technology
  2. Positioning Algorithms
  3. Low Power Communication
  4. Mesh Networking
  5. Cross Layer Optimization
  6. SOC Feasibility

Our RTLS solution is outperforming by concept

By the use of the max allowed bandwidth



Key RTLS technology worldwide patented

KOPIE

US 20080291090A1

(19) **United States**

(12) **Patent Application Publication**

Vandenameele

(10) **Pub. No.: US 2008/0291090 A1**

(43) **Pub. Date: Nov. 27, 2008**

(54) **METHOD FOR ESTIMATING DISTANCE BETWEEN TRANSMITTER AND RECEIVER, AND TRANSMITTER AND RECEIVER IMPLEMENTING SAME**

(76) Inventor: **Patrick Vandenameele**, Bertem (BE)

Correspondence Address:
AKERMAN SENTERFITT
P.O. BOX 3188
WEST PALM BEACH, FL 33402-3188 (US)

(21) Appl. No.: **12/158,519**

(22) PCT Filed: **Dec. 20, 2006**

(86) PCT No.: **PCT/EP2006/070040**

§ 371 (c)(1),
(2), (4) Date: **Jun. 20, 2008**

(30) **Foreign Application Priority Data**

Dec. 23, 2005 (EP) 05112981.5

Publication Classification

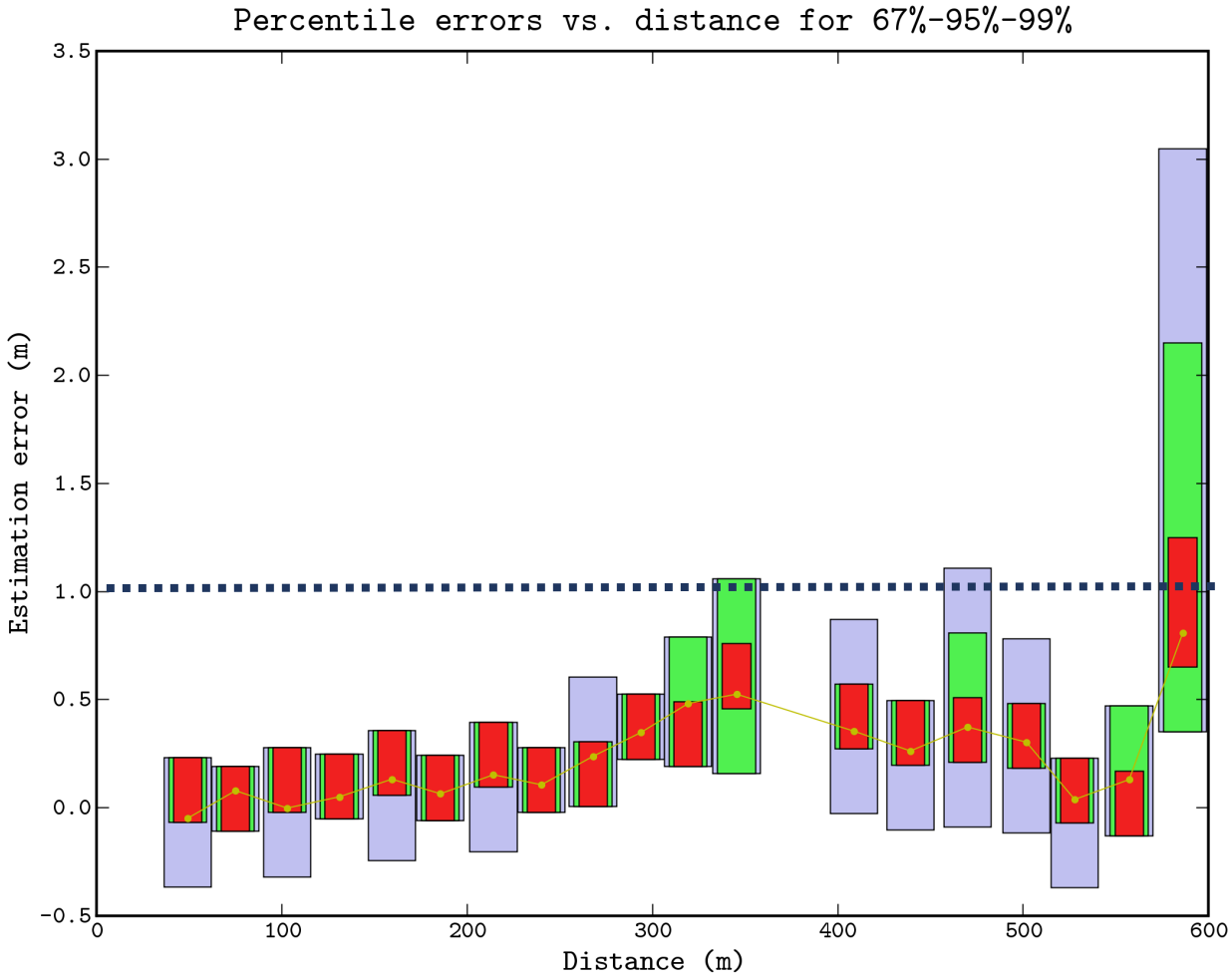
(51) **Int. Cl.**
G01S 11/00 (2006.01)

(52) **U.S. Cl.** **342/387**

(57) **ABSTRACT**

A method for estimating the distance between a transmitter and at least one receiver. The transmitter has radio transmission circuitry, at least part of which is operable in a first operation mode for transmitting a first signal type within a first bandwidth and in a second operation mode for transmitting a second signal type including at least a ranging component which occupies a second bandwidth which encompasses and exceeds the first bandwidth. The method includes the steps of: (i) operating part of the radio transmission circuitry in a second operation mode, (ii) transmitting a signal of a second signal type, (iii) receiving a signal on one receiver and (iv) estimating the distance between the transmitter and a receiver from the ranging component in each received signal. A suitable transmitter and receiver for implementing the method are described.

Performance validation: measured data



Competitive positioning

Why the combination of range and accuracy is important

beacon

box

UWB

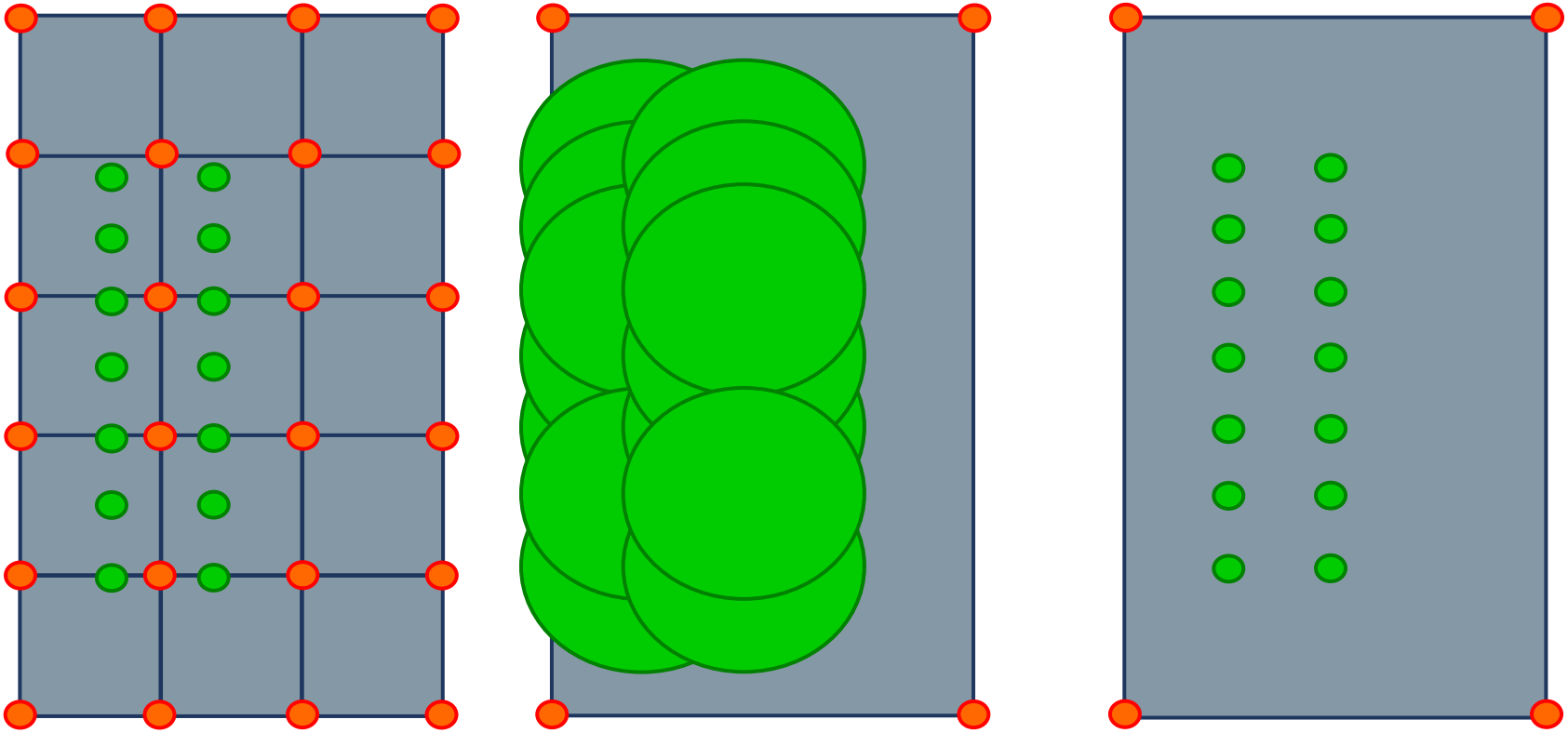
- accurate position (15 cm)
- Too many base stations required

RSSI

- Inaccurate position (4-6m)
- Good coverage

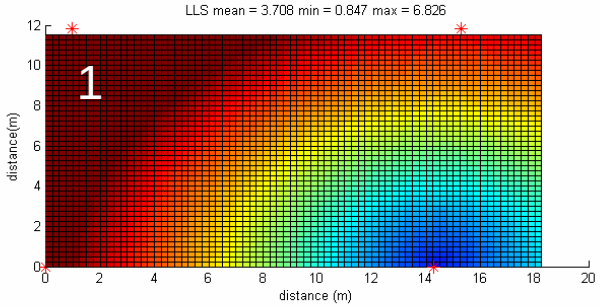
LOST

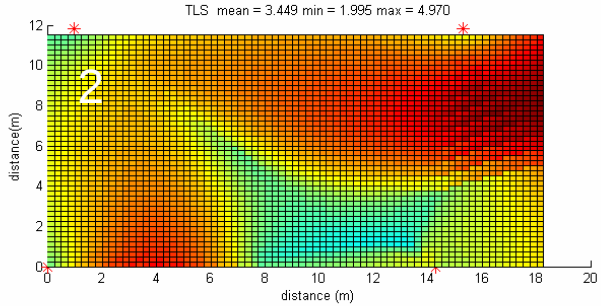
- accurate position
- Good coverage

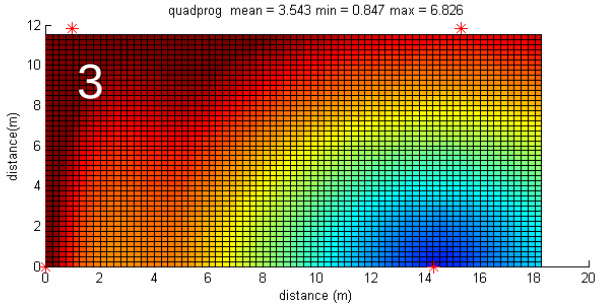


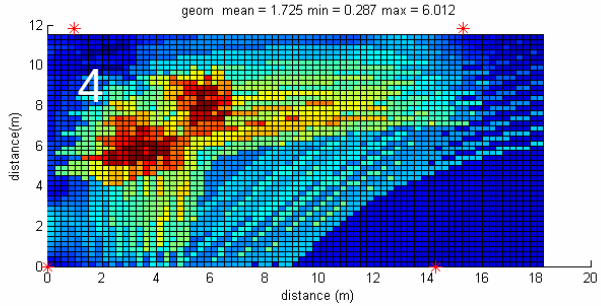
LOST technology implements superior NLOS algorithms

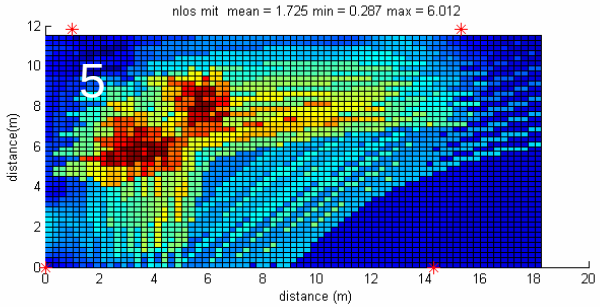
A novel positioning algorithm translates distances into positions

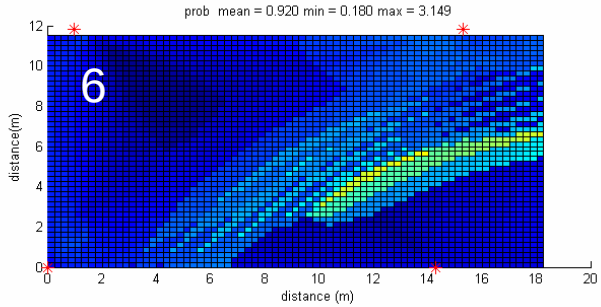












LOST products for accurate 2-way ranging

Translating LOST technology into products (1)

- LOST PCB supports Two-Way Ranging
- Symmetrical setup

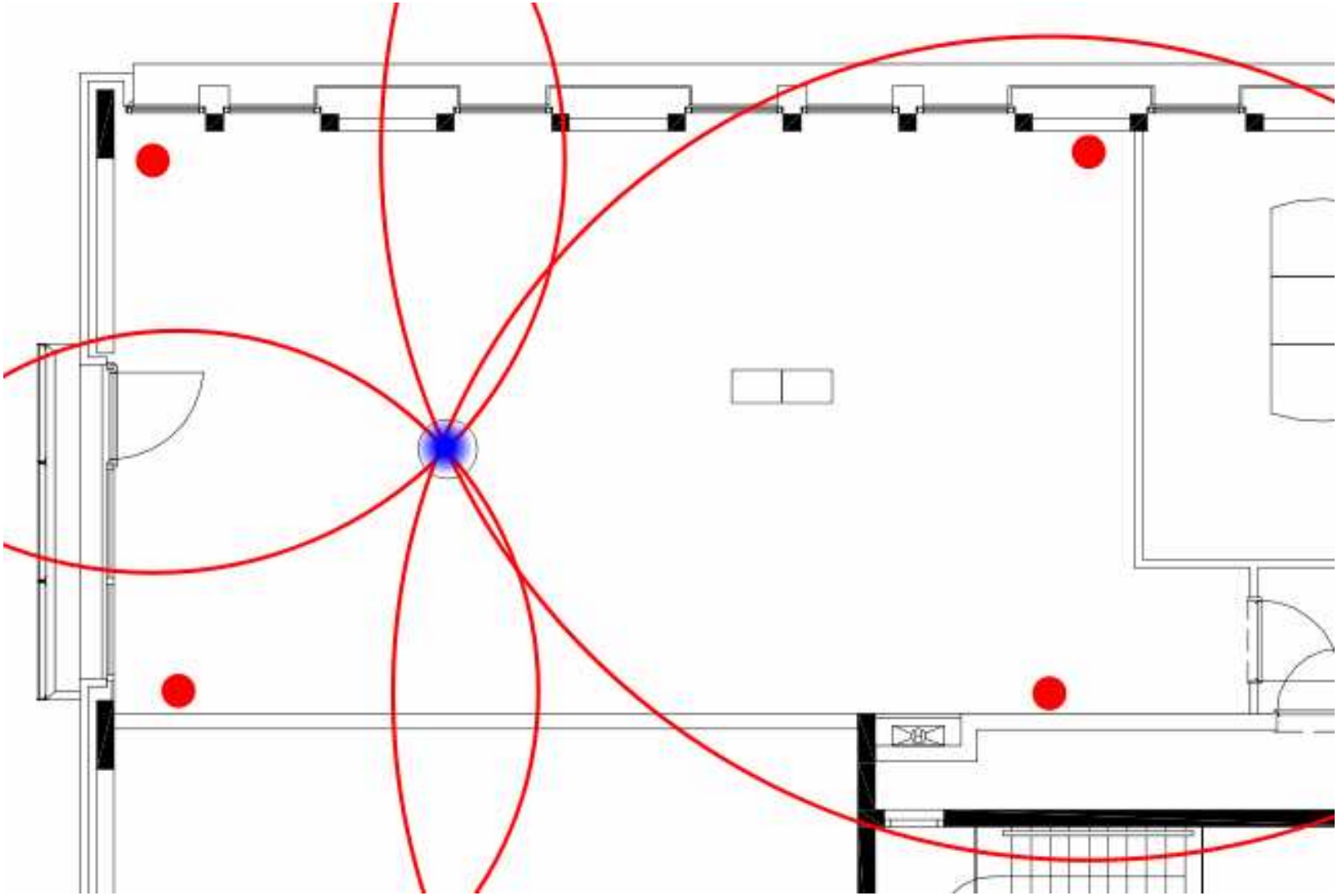
indoor

outdoor

LOST technology on ToA
2-way ranging

Two-Way Ranging setup

Base station Mobile node



LOST product for compact 1-way ranging

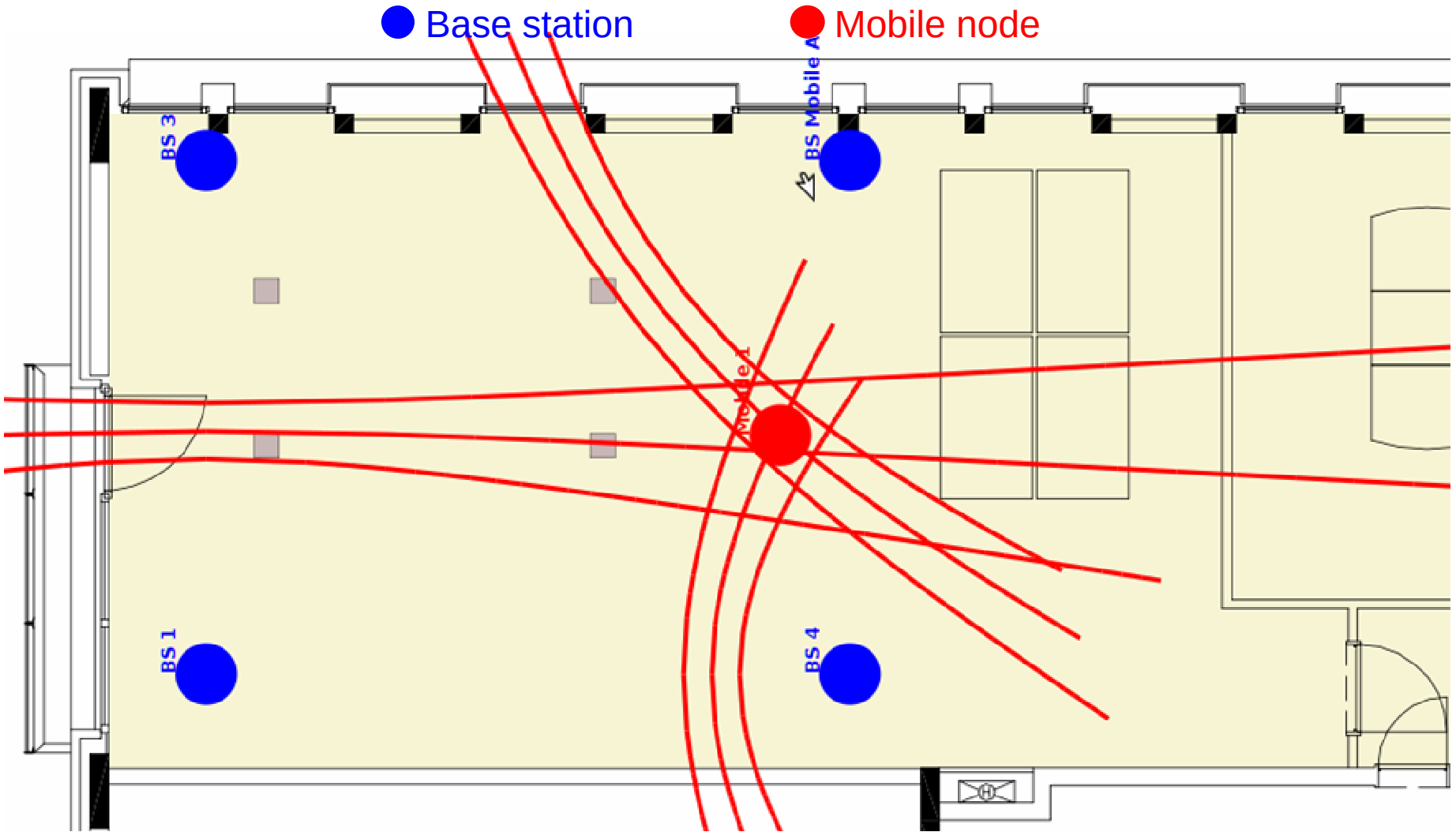
Translating LOST technology into products (2)

- Time-Difference-of-Arrival (TDoA) node
  - Small form factor
  - Multi-year life time
  - Slightly reduced accuracy
- Uses LOST board as base station
- Targeted towards people tracking
- Coexists with TWR nodes

- Novel base station synchronization
  - No synchronization wires needed !

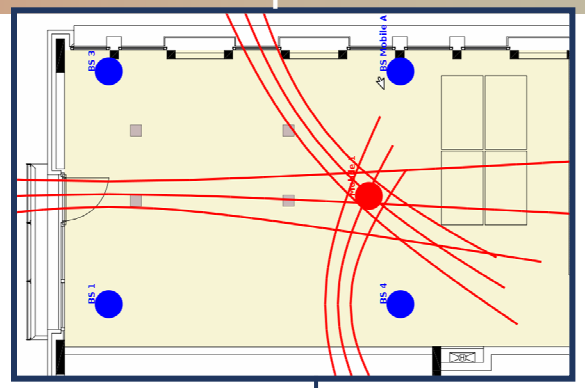
LOST technology on TDoA 1-way ranging

Time-Difference-of-Arrival setup



Evolution from lab set-up over various PCB's towards SoC implementation

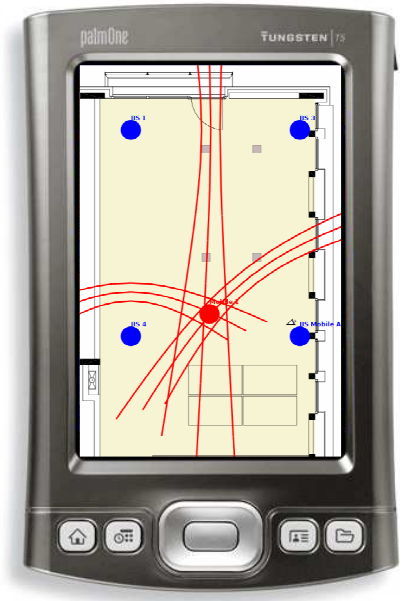
- Mode 1: stand-alone
  - TDoA node transmits LOST signals
  - Position is computed centrally
  - Position is handled centrally
    - Database/gui/…



WiFi/GPRS/…

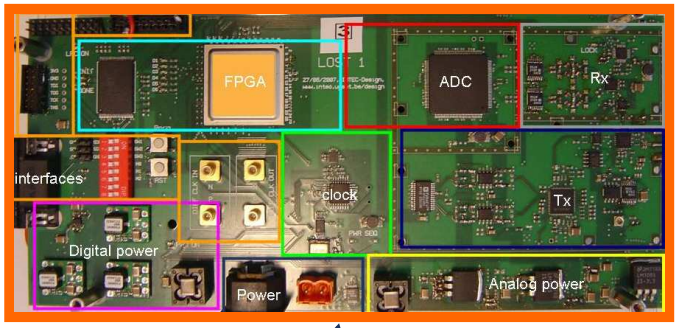
LOST

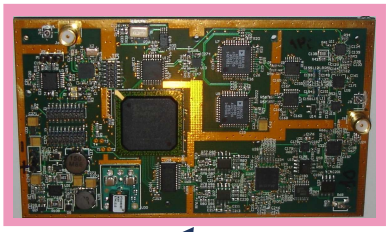
- Mode 2: Interface with PDA
  - TDoA node transmits LOST signals
  - Position is computed centrally
  - Position is communicated to PDA
    - Over WiFi/GPRS/…
  - PDA handles portable GUI

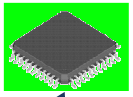


LOST technology roadmap

Evolution from testbench over various PCB's towards a SoC







2006 Q2 Q3 Q4 | 2007 Q1 Q2 Q3 Q4 | 2008 Q1 Q2 Q3 Q4 | 2009 Q1 Q2 Q3 Q4 | 2010 Q1 Q2

Lab verification

Demo prototype.

Portable

Wristwatch

LOST SoC

Skills requirements

3 concurrent skill needs

Low power/Wireless

to make it work

Alcatel/STM

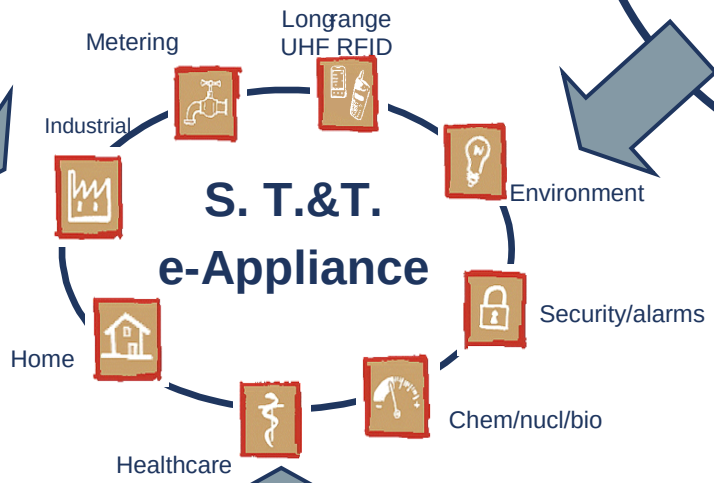
Coronis

SOC- ASIC

to make it small & low cost

Silterra

KeyAsic



Embedded SW

to efficiently integrate

Mind