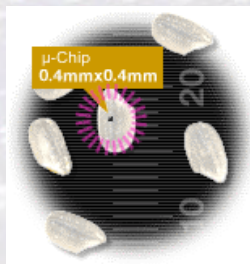
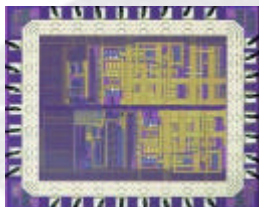


RFID tags for ambient intelligence: present solutions and future challenges



Presentation Outline

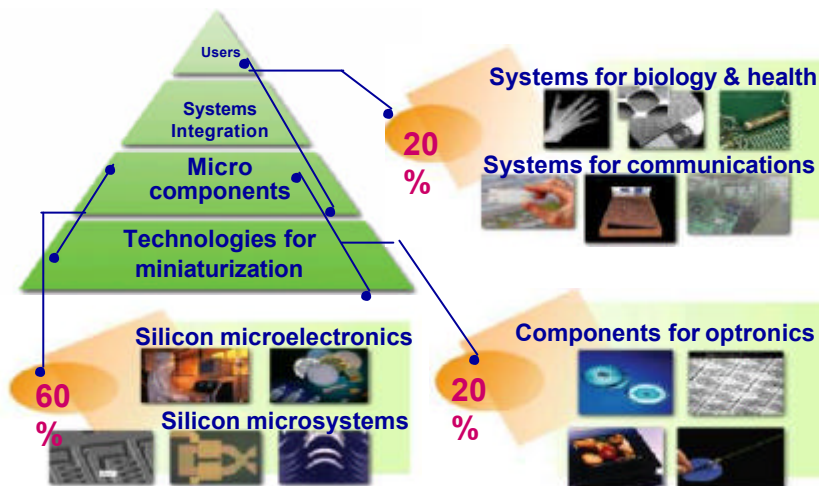
- Smart devices program at LETI
- Overview of RFID
 - Basic principles
 - Regulation issues
 - Performance & cost
- RFID and Aml
 - Business models and scenarios
 - Future challenges
 - Privacy issues

Leti : activities, facts & figures

- . 160 M€ yearly revenues
- . 44 M€ investment
- . 70% from contractual resources

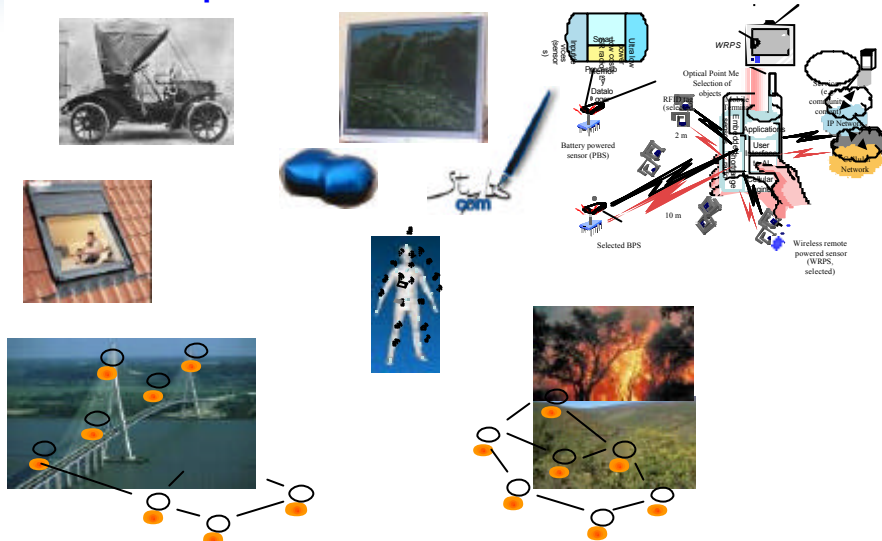
. > 150 patents in 2004

- . 900 CEA employees
- . 570 hosted scientists



Context

Spread of electronic functions



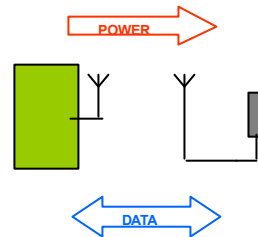
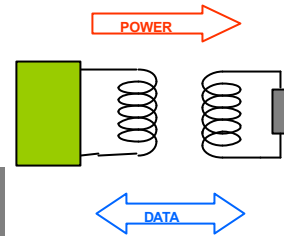
Basic principles of RFID

➤ Inductive coupling

- ✓ Magnetic field (near field) 13,56 MHz
- ✓ Antenna = Coil

2 elementary functions

- 1- Power Transfer
- 2- Bi-directional data transfer

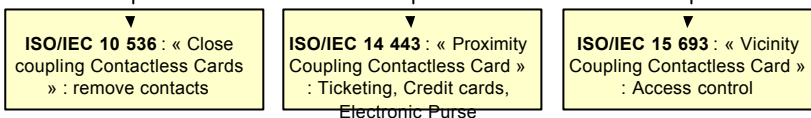


➤ Electric coupling

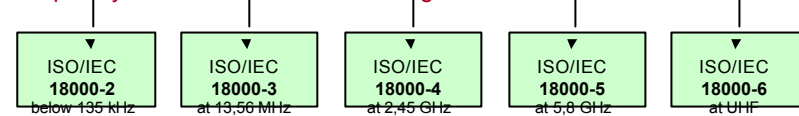
- ✓ Electric field (Far field) at 868 MHz, 2,45 GHz
- ✓ Antenna = wired or planar

Regulation issues

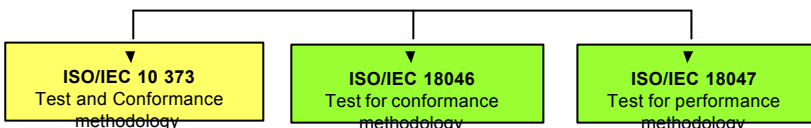
• **Contactless Cards** : frequency 13,56MHz, format of support : credit card



• **Item management** standards: « Automatic Identification – Radio Frequency Identification for Item Management »



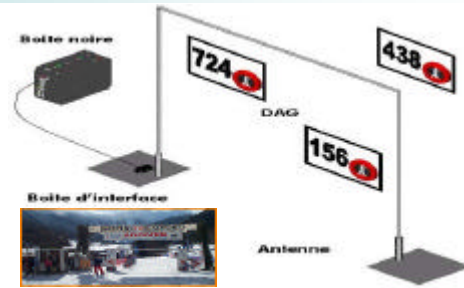
• **Test & Conformance** standards:



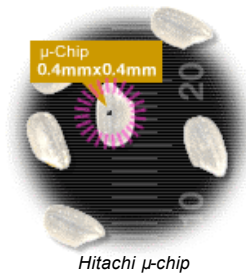
Performance & cost

- Reading distance
- Anticollision
- Data rate
- Cost

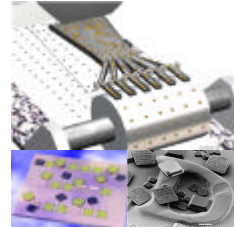
- silicon die
- antenna
- tag materials
- assembly



DAG Systems for sport competition

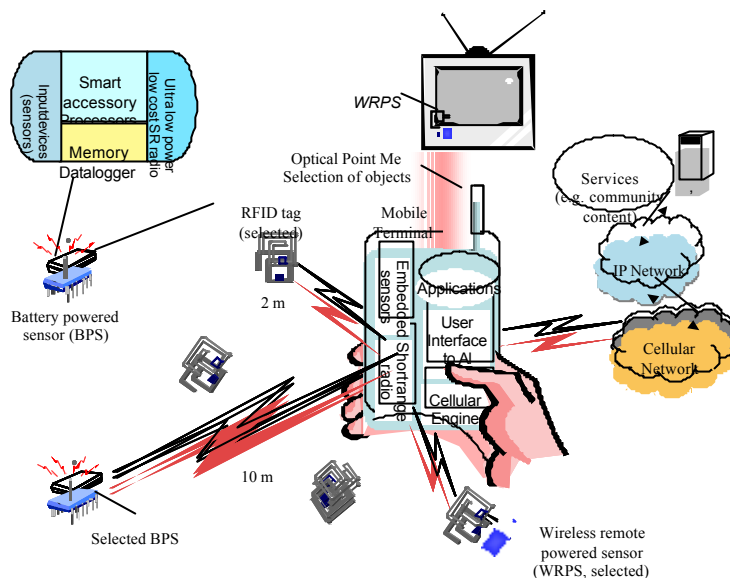


Hitachi μ-chip



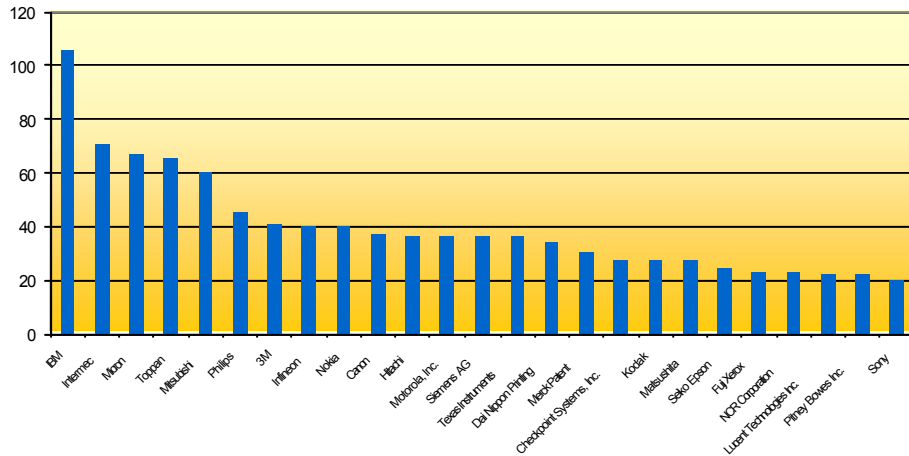
Alien microfluidic assembly technology

RFID and Aml



RFID and Aml

Leading world patents holders



Privacy issues

What are people afraid of?

Tag reading without the user consent and/or awareness

Every device is traced (unique code for each product)

Association between the object (+ the owner?/!) and a data basis

Risks

Spam like strategies

Spying of consumer behavior

Refusal of rfid by consumer groups

Source : CEA- LETI
O Savry

Privacy issues

The “Kill Tag” approach

The Faraday Cage approach

mobilecloak.com

The Active Jamming Approach

The “Smart” RFID Tag Approach

The “HashLock” approach (Weis & al)

The reencryption approach (Juels and Pappu, Golle & Al)

Silent TreeWalking (Weis & al – reader encryption)

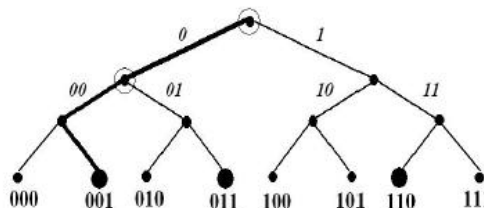
The Regulation Approach

Source : *The Blocker Tag: Selective Blocking of RFID Tags for Consumer Privacy*
Ari Juels, Ronald R Rivest, Michael Szydlo

Privacy issues

Blocker tags

The approach is based on singulation & tree walking protocols

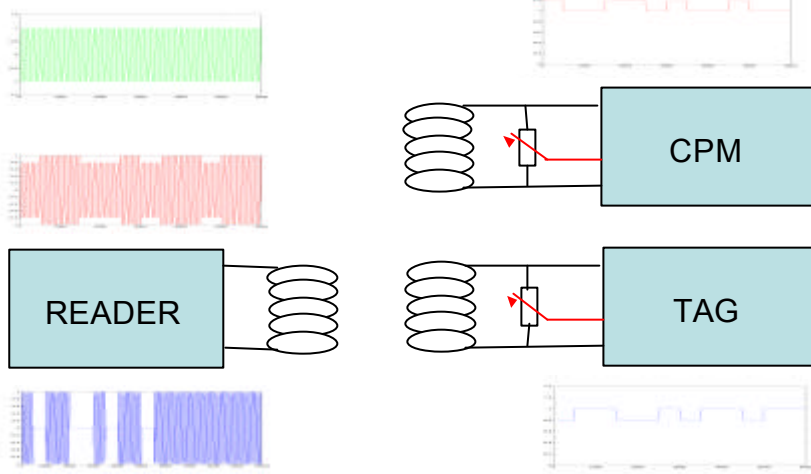


The blocker tags (two antennas) broadcast simultaneously a 0 & a 1 at each node of the tree (full blocker) or specific nodes (partial blocker) and forces the reader to explore large amounts of branches (>> 2^{64} !!!).

Source : *The Blocker Tag: Selective Blocking of RFID Tags for Consumer Privacy*
Ari Juels, Ronald R Rivest, Michael Szydlo

Privacy issues

- Use of a specific device to enable communications between the tag and the reader.



Thank you for your attention