Recycling and biodegradability of RFID

CERP#7 meeting
F.Le Gall

www.inno-group.com

Context

- Mandated by the French “pole de competitivite MauD”, situated in the Lille region in France, to undergo a study aimed at evaluating the research interests in the field of **recyclable and biodegradable RFID tags.**
  - Identification of running initiatives in the field
  - Opportunities to launch a research activity on such topics,
  - Potential partners with whom R&D cooperation should be sought.

Main results

- Very few people/organisations having seriously considered the issue while most of them consider it has important
- Issues are not today on recycling of the tags but potential perturbations of recycling streams by RFID tags
  - By construct, tags not easy to remove
  - Contamination by tags substrates and antenna metals
- Mostly concerned : passive tags. Active tags follows electronic products recycling directives

R&D orientations

- Short term
  - Compatibility of RFID tags, usage and support recycling stream
- Medium term
  - Life cycle assessment: RFID tags enabled LCA databases building
- Long term
  - Biodegradable tags

Missing information

- Impact of emerging technologies
  - Printed electronic, molecular elecronic, organic electronic, micro power

Topics requiring new or intensified research

	Before 2010	2010-2015	2015-2020	Beyond 2020
Vision society	• Wide take up of RFID	• Integration of objects	• Internet of things	• Unlocked full potential of the Internet of Things
People	• Socially acceptable RFID	• Ambient assisted living • Biometric IDs • Industrial ecosystems	• Smart living • In-vivo health • Security based living	• Mastered continuum of people, computers and things • Automated healthcare
Politics	• First global guidance • Standardisation	• First global governance • Unified open interoperability	• Authentication, trust and verification	• Inclusive Internet of Things
Standards	• Network security • Ad-hoc sensor networks • Protocols for distributed control and processing	• Interoperability protocols and frequencies • Power and fault resilient protocols	• Intelligent devices cooperation	• Health security

	Before 2010	2010-2015	2015-2020	Beyond 2020
Vision technology	• Low power and low cost	• Ubiquitous integration of tags and sensor networks	• Code in tags and objects	• Smart objects everywhere
Use	• Interoperability framework (protocols and frequencies)	• Distributed control and databases • Ad-hoc hybrid networks • Harsh Environments	• Global applications • Self-adaptive systems • Distributed memory and processing	• Heterogeneous systems
Devices	• Smart multi-band antennas • Smaller and cheaper tags • Higher frequency tags • Miniaturised and embedded readers	• Extended range of tags and readers and higher frequencies • Transmission speed • On-chip antennas • Integration with other materials	• Executable tags • Intelligent tags • Autonomous tags • Collaborative tags • New materials	• Biodegradable devices • Nano-power processing units
Energy	• Low power chip sets • Thin batteries • Power optimised systems (energy management)	• Energy harvesting (energy conversion, photovoltaic) • Printed batteries • Ultra low power chip sets	• Energy harvesting (biology, chemistry, induction) • Power generation in hash environments • Energy recycling	• Biodegradable batteries • Wireless power

Source: Internet of things in 2020 – EPoSS working group report

Next steps

- Many thanks to all persons having contributed to the study
- Final report to be presented end of October
- All:
  - Contributions
  - Comments
  - Interests for cooperation still more than welcome

Franck Le Gall
inno group
Tél. : +33.4.92.38.84.18
E.mail: f.le-gall@inno-group.com

Thank you for your attention!