THE EPC NAMESPACE AND THE INTERNET OF THINGS (IoT)

Why the EPC Namespace could be opened to a wider community than Business-to-Business...

What could be the actual scope for the EPC Network ?

- The EPC namespace is currently 100% controlled by EPCglobal, a GS1 US and GS1 WW joint venture (fee based participation)
- GS1 is – *today* - mainly representing CPG private interests (Consumer Products Goods)
- EPCGlobal standards are public and freely available

The EPC Namespace : facts

- The EPC Namespace can technically support many differents naming schemes
  - Industry (GS1, IATA, automotive, etc.)
  - It could be extended (mapping) to many different other schemes (citizen, consumers, associations, etc.)
  - It could also support different location schemes (GPS/Galileo, signposts and viewpoint information boards, etc.)
- Throughout the ongoing EPCglobal standardization, it can be the most interesting scheme to address the **« Internet of Things »** topic

EPCGlobal : Only « RFID based » ?

- RFID UHF Class 1 Gen 2 (current standard) **VS** :
  - NFC
  - ZIGBEE
  - 3G/3G+, WIFI / WIMAX,
  - 2D Barcodes, etc.
- Although EPCglobal does not yet support those technologies *(should require the adaptation of the assignment of the identifiers),* the « big thing » is not about physical support for identification (such as RFID) but about :
  - Unique identification of the Objects (naming + serialization)
  - Governance and use of this naming system

Potential players

(not – currently - really addressed within the EPC naming scope)

- Consumers / Citizens
- Public bodies (libraries, museums, etc.)
- Infrastructure/service providers
  - TELECOM/GSM providers
  - Internet service providers (ISP)
  - Etc.
- Any company facing WEEE directives
  - (that makes EU producers of new equipment pay for the recycling and/or safe treatment and disposal of the products they put on the market when they eventually come to be thrown away)
    (source : http://www.environment-agency.gov.uk/business/1745440/444663/1106248/)
- *And many others !*

Is the EPC network *(and the EPCglobal standards)* a release candidate for the Internet of Things ?

Arguments for the Opening….

….Of the EPC Namespace

Why we should keep the EPC Namespace for the IoT (1/2)?

- It can have a « context/business meaning » based on its structure (8 bits header or URN prefix) – that is not the case for IP V6
  - Industry based
  - Other sectors (public, etc.)
  - There could be « 8 bit headers » available for citizen in the current scheme and even though there would be only one, it could be extended :
    - "Even with the 96-bit tags available today, we could use 40 bits for a 'citizen ID' element (enough for 100 billion citizens) - and still have 45 bits for serial numbers (enough to allow each citizen to index over 11,000 objects per second throughout their 100 year lifespan). That might be just enough for most citizens" *(Mark Harrison, Auto-ID Lab. CAMBRIDGE)*
    - There is no necessary need to pre-allocate IDs for every citizen (which is a privacy risk) since those Ids will be allocated once bought to some EPC wholesalers (see after).
  - There will be different 8 bit headers for different IDs lengths (96, 128, 512 bits….)
    - Today, there are already existing one header for SGTIN-64, one for SGTIN-96 and a third for SGTIN-198 - and similar for other GS1 identifier schemes
    - We could imagine as well headers for EPCs that do not have specified lengths (user driven specifications) to emphasize a "randomly based" protection
  - It allows additional data to be written in the HW ID support (mapping between header value and EPC length + potential additional data)
- It is « lookup services » compatible (DS, etc.)

Why we should keep the EPC Namespace for the IoT (2/2) ?

- Unstructured or meaningless codes are not really suited to solve the privacy issue
  - Identification / tracking of a consumer throughout his personal set/association of objects (coat, shoes, etc.)
- It can guarantee uniqueness / non-collision in the global numbering of the objects (such as IP V6)
- It can be split in full structured codes (industry) and generic ones
  - Full structure : ID of the owner, product type + serial number
  - Generic : could be dispensed by EPC Wholesalers for their customers (consumers, citizen, other industries, public bodies, etc.)
- It could be used with many different physical ID carriers (RFID, NFC, BARCODES, etc.)
- It is supported by a full set of standards / networking technologies that does makes sense in terms of **business-to-business** and **business-to-any** processes (EPCglobal)

The Privacy pending issue (RFID)

- Although the WEEE directives….
- ….**Privacy** is the underlying question behind the different phases in the lifecycle of an object, moreover when entering the private sphere *(manufacturing / supply chain / **private use** / recycling / etc.)*
  - A survey is currently processed by the EU commission to choose whether to deactivate (killing) or not the RFID tag at the cashier's level in order to protect the consumer's privacy (consumer = citizen)
    - Link : http://ec.europa.eu/yourvoice/ipm/forms/dispatch?form=RFIDRec
- Could the opening of the **EPC Namespace** be a part of the solution ?….

Prospective thoughts regarding the opening of the EPC Namespace….1/4

Opening the EPC namespace ….

- ….could give the opportunity to the consumer to « participate » the EPCGlobal Network (by owning a part of the namespace) and would give him accordingly the capability to "rename" the object once the object is entering his own privacy context (more generally, each time, in the lifecycle of an object, a new "ownership phase" begins)

Prospective thoughts regarding the opening of the EPC Namespace….2/4

Opportunities
….

- Contrary to the « deactivation solution », one then can go on using the opportunities that the identification of the object gives to some relevant value chain (after sale maintenance, recycling, etc....)
- Compliance with the WEEE directives is then potentially supported by the EPC Network

Prospective thoughts regarding the opening of the EPC Namespace….3/4

Helping to keep control over the private sphere….

- At the cashier's level, the new identification would then be given by the consumer **though his EPC# provider(s)**:
  He could then decide whether or not the link between the former ID and the new one has to be seen or used by the actors on the value chain.
  - **Action :** In the supermarket area with his mobile phone, in the car's boot (flashing device) or at home with some specific device
  - **New EPC# :** provided indirectly (contracts) by ISPs, GSM providers, Office Automation providers, Banks, Insurance companies, Notaries, Retailers, etc….
    - At low prices (like Internet domains ones) : selling/renting of EPC ranges
    - As value added services (Providing of Discovery Services, identification/Authentication services, packaged security services, etc.)
    - Those actors would then become some kind of « EPC wholesalers » as part of their daily business and could act on the Internet of Things on behalf of their customers (as trusted third parties, etc.)
- The consumer could also choose what kind of physical ID support he would use in place of the RFID tag
  - With full use of the RFID tag or disabling of the far-field UHF antenna or deactivation of the tag and replacement by NFC tags, Barcodes, etc….

Prospective thoughts regarding the opening of the EPC Namespace….4/4

How ….

- Built-in mechanisms in the **« Discovery Services »**
  - Although the information provider (the one who « sees / reads » the object) is the one controling whether or not it makes the information available to the others (in the EPCIS)….
  - ….The link between **former IDs** and **newer ones** will only be stored within the Discovery Services (standards to be designed and ratified) the end user had chosen (the one of its EPC wholesaler for instance)
    - « Possibly in a similar way to handling aggregation events » *(Mark Harrison – Auto-ID Lab. CAMBRIDGE)*
    - reducing accordingly the risk of spreading/using private information (more difficulty to find the equivalence between those 2 IDs and to give a meaning to the read information)
    - For a stronger security, there must be also a parallel use of a safer HW ID technology such as 2D Barcodes, NFC or « RFID disabled far-field UHF antenna » (RFID tags with pre-cut antenna)
  - + Full Control over the ID pedigree (by default, there is no link between former IDs and new IDs) via dedicated set of privacy rules
    - Depending on predetermined processes / security packages / accreditation of genuine parties
      - EG : Customer warranty process, recycling….
      - « Packaged Value added services » delivered by the EPC Wholesalers related to their daily business
    - Or ad hoc processes (« situated » authorizations, etc.)
    - SAML / OpenID-Liberty Alliance protocols, etc.
- Independent audits on « certified » Discovery Services
  - Based on EU regulations ?
  - Based on ITU regulations ?
  - Etc.
- No use of the ONS for such generic codes (ONS is too much centralized) !

Additional needs and comments for such an alternative 1/2

- The relevant **Discovery Services** should be
  - Decentralized (peer-to-peer model with DS-DS protocol)
  - In some cases « Organization agnostic »
- Discovery Services becomes therefore **critical** in the EPCGlobal network and/or Internet of Things !
  - « DS » become the « KEY » for Privacy issues (much more value than any other EPCglobal layer/service)
  - The DS-DS protocol (to be defined) will have to carefully undertake this « privacy » dimension
  - Need for dedicated R&D (EU projects, etc.) ?
- Availability of cheaper **personal** RFID/NFC/Barcode (ID HW solutions) **printers/encoders** - for end users (there are projects to use special inks to create RFID tags on paper labels)
- RFID/NFC reader/encoder embedded on GSM phones
- Cheaper readers (NABAZTAG®, Home devices, etc.)
- Raise of a new « pay per use » business based on the permanent traceability of any objects (challenging the « property » concept)

Additional needs and comments for such an alternative 2/2

- There is still a need for global governance
  - Global number's allocation : Who ?
  - Number's uniqueness : 1 entity for the global governance ?
  - Evolutions (scheme, capacity, etc.) : idem but open source
- Potential actors for such a governance
  - An « extended GS1 »
    - GS1 has a strong historic credibility for it but should be accordingly extended (public, citizenship, other industries, etc.)
  - Extended ICANN (the global internet governance must be first solved)
  - ITU (http://www.itu.int/net/home/index.aspx) : the UN credibility
  - A mix of them ?....

OPENING THE EPC NAMESPACE COULD MAKE THE EPCGLOBAL NETWORK THE INTERNET OF THINGS IN CASE WE MANAGE TO SOLVE 2 IMPORTANT ISSUES :

1) THE DESIGN OF EFFICIENT « DISCOVERY SERVICES »
2) A GLOBAL SOLUTION FOR GOVERNANCE

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