Universal Identifiers

or

How to connect “Things” and “Information about Things”

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Outline

• Why universal identifiers?
• Different approaches for universal identifiers
• Pros and cons of different approaches
• Conclusions
Why universal identifiers?

Current situation

Forwarder-independent tracking example

With universal identifiers
Universal identifiers in PLM

Centralised identifier and information management: no need for universal identifiers (?)

Distributed: universal identifiers necessary, explicitly linked remote information sources

Peer-to-peer based: universal identifiers necessary, remote information sources identified dynamically
EPC, ID@URI and other universal identifiers

- **EPC:**
  - Only identifier
  - Allocated by GS1 at least for Manager IDs
  - No embedded link to remote information sources
  - Object Name Service (ONS) proposed as solution for retrieving links to remote information sources

- **ID@URI**
  - Identifier (can also be EPC) and embedded link to remote information
  - ID part can be freely allocated, URI allocation is hierarchically managed

- **Distributed Hash Tables (DHT)**
  - Identifier is used as key for identifying remote information sources
  - Could be allocated by network itself (no central allocation body)
EPC

• Pros
  – Globally unique by itself
  – Compact
  – Existing coding schemes can be mapped to EPC

• Cons
  – ONS lookup necessary to retrieve link to remote information
  – Support for new coding schemes requires approval by EPCglobal (?)
  – Most companies already use many different coding schemes – why introduce a new one again?
ONS

• When will a global ONS infrastructure be operational?
• How much effort does it require to join it? Is it feasible/interesting e.g. for small companies?
• Current standard only supports ”product type” level lookups – how can e.g. shipment tracking be performed with that?
• Why not just set up a bunch of web pages or similar that map GS1 manager IDs to URI/URLs?
ID@URI

- **Pros:**
  - Globally unique combination (under certain conditions)
  - Needed standards and infrastructure exist
  - Light-weight to use
  - Ad-hoc applications are easy to create, e.g. ticket reservation by reading barcode from advertisement
  - No need to be member of EPCglobal or any other organisation to use

- **Cons:**
  - Requires more space than EPC
  - Changes in URI may be problematic
  - No standard for how to represent ID@URI
Distributed Hash Tables DHT

• Pros:
  – Does not rely on DNS
  – Fault-tolerant:
    • Lookup mechanism works even though parts of network are down
    • Even though some information sources would be down, the rest of the information can still be retrieved
  – Adaptive: new nodes can be added and removed at any time
  – Existing ”example implementation” exists: Trackway

• Cons:
  – Not standardised, many versions exist for different purposes
  – Requires a minimal installed base in order to give added value
Conclusions

• Globally unique identifiers are necessary in multi-organisational contexts where a huge, centralised service is not feasible to set up

• System for locating remote information sources is an architectural element of its own (ONS, ID@URI, DHT, other):
  – DHT comes down to ID@URI once list of information sources is retrieved
  – EPC/ONS comes down to ID@URI after ONS lookup
  – EPC+DHT can be used as well as EPC+ONS

• Do we really need ONS? Maybe, but at least we can start without it!