WINGS – Building Federated Architecture for the IoT

26/09/2011

WINGS bénéficie d'une aide de l'Agence Nationale
de la Recherche sous la référence ANR-09-VERS-015

Outline

- WINGS Objectives
- Proposed modification to existing ONS standard for the DNS-based approach
- DNS-based functional and quantitative tests
- The possibility of the F-ONS platform being agnostic to other identification schemas
- Call for participation & Conclusion

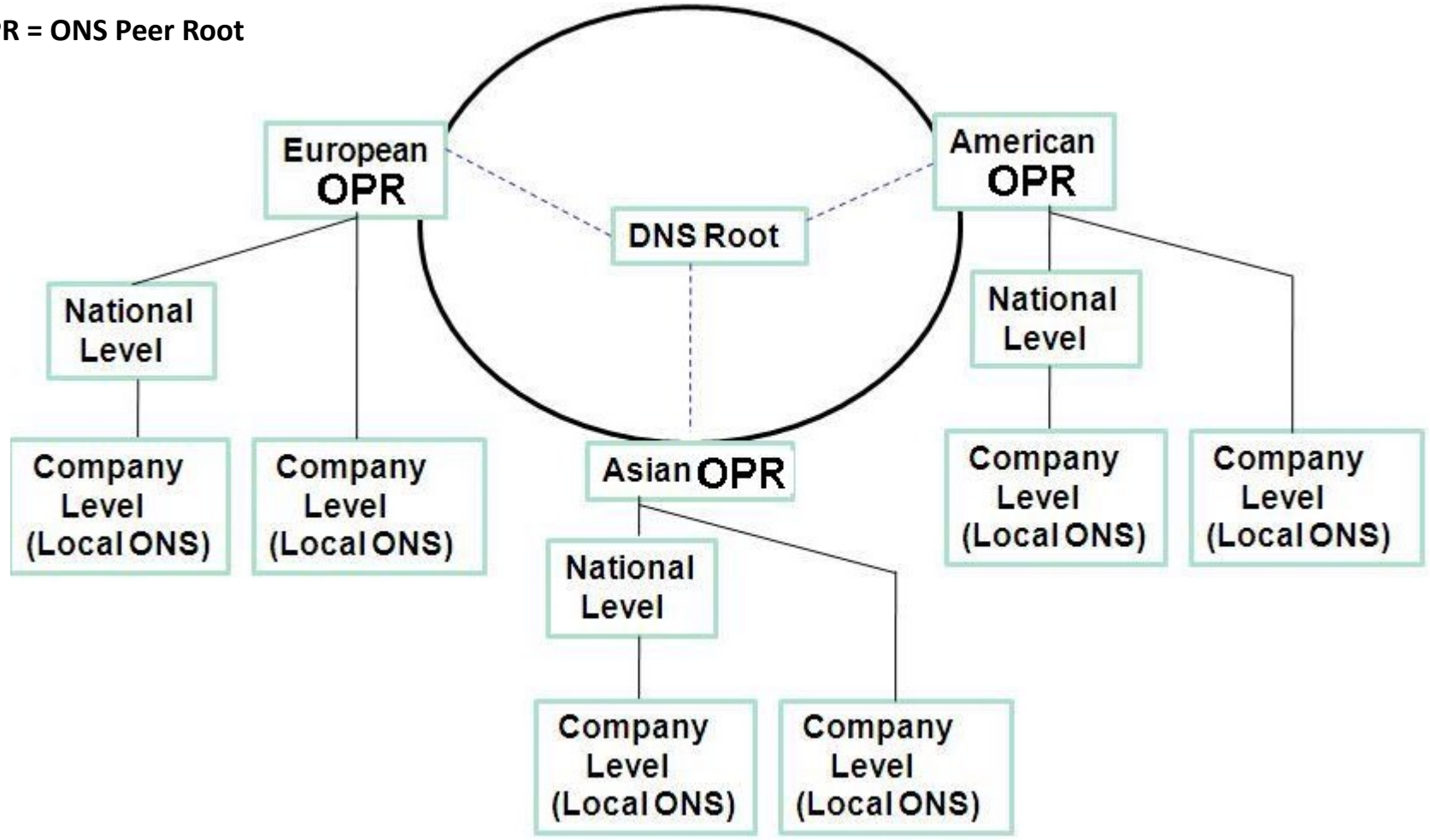
WINGS Project Objectives

- WINGS (Oct.2009 – Feb.2012) with representation from both Industry and Academy
- *Objective* : Propose, experiment and evaluate a F-ONS architecture based on two approaches - DNS and P2P
- Functional and quantitative tests conducted on the two approaches
- Each approach scored and weighted using a matrix of criteria and a set of user requirements
- Experience from WINGS has already helped contribute to :
  - The requirements document drafted by the EPC ONS requirements committee
  - The standards on F-ONS as well as Discovery Services.

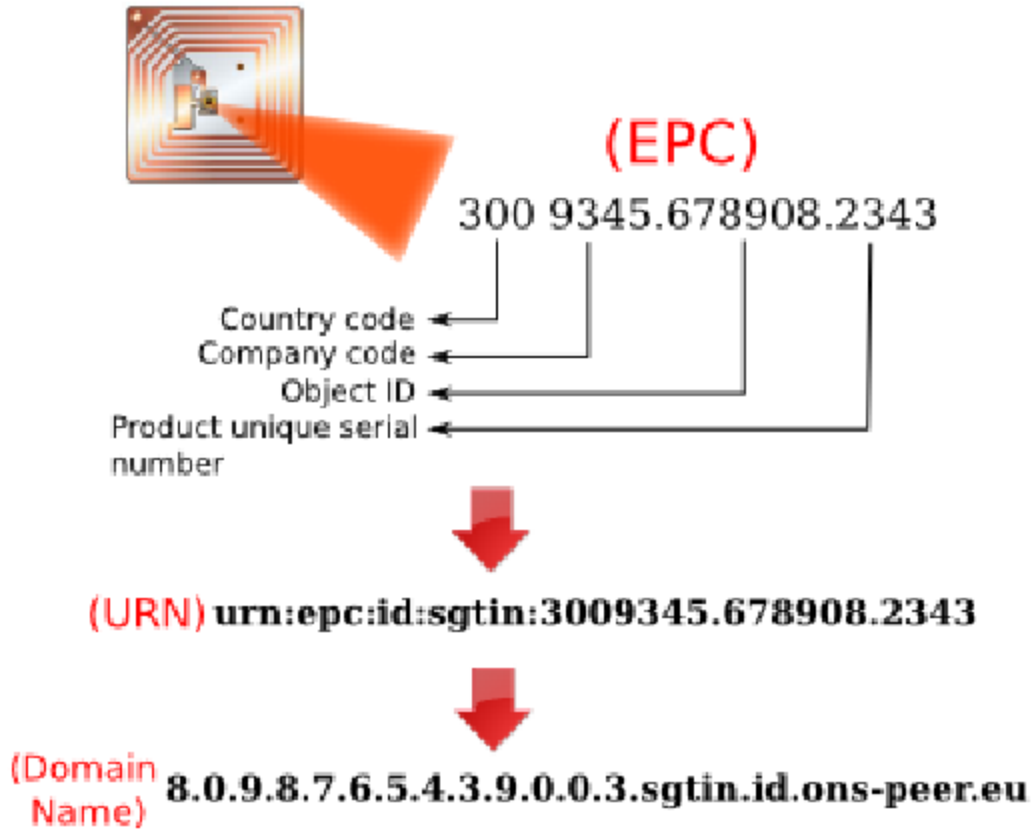
AFNIC's DNS-Based Approach

- Proposed Architecture

OPR = ONS Peer Root

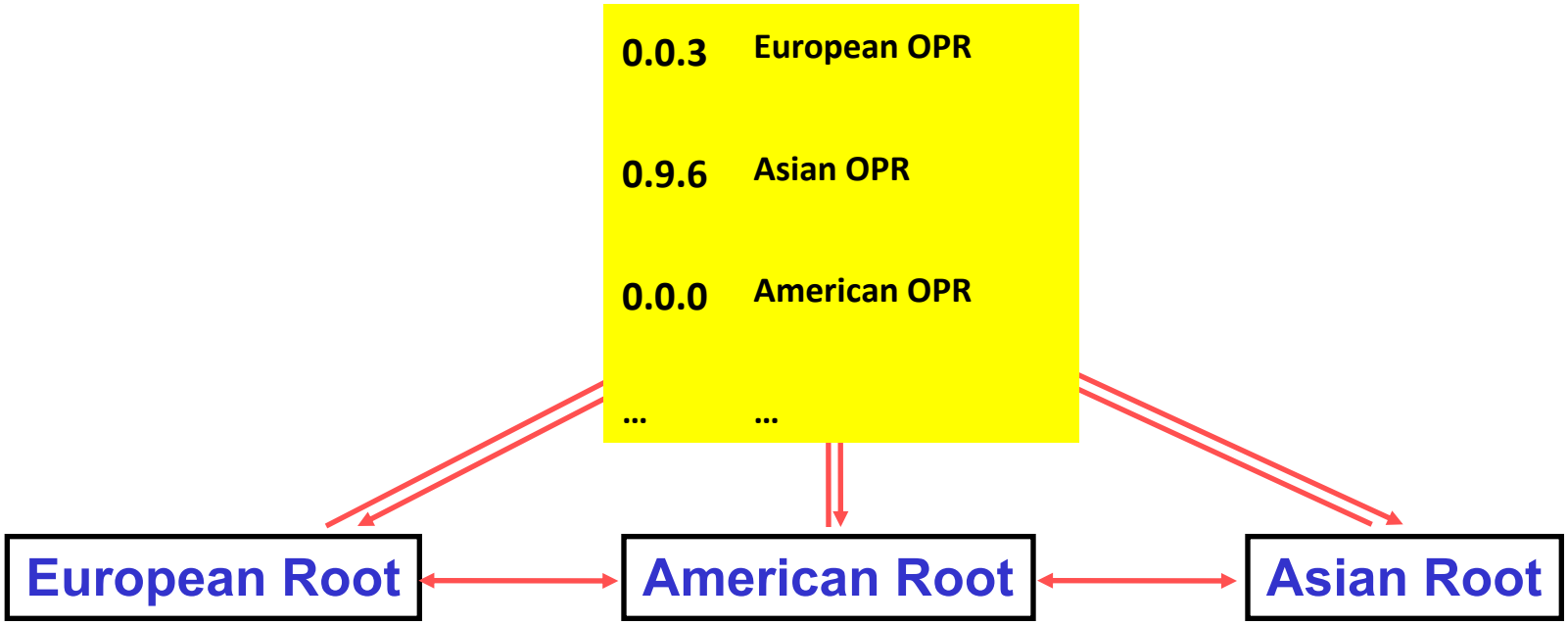


AFNIC's DNS-Based Approach
- Query Format



AFNIC's DNS-Based Approach

- Common Mapping Table



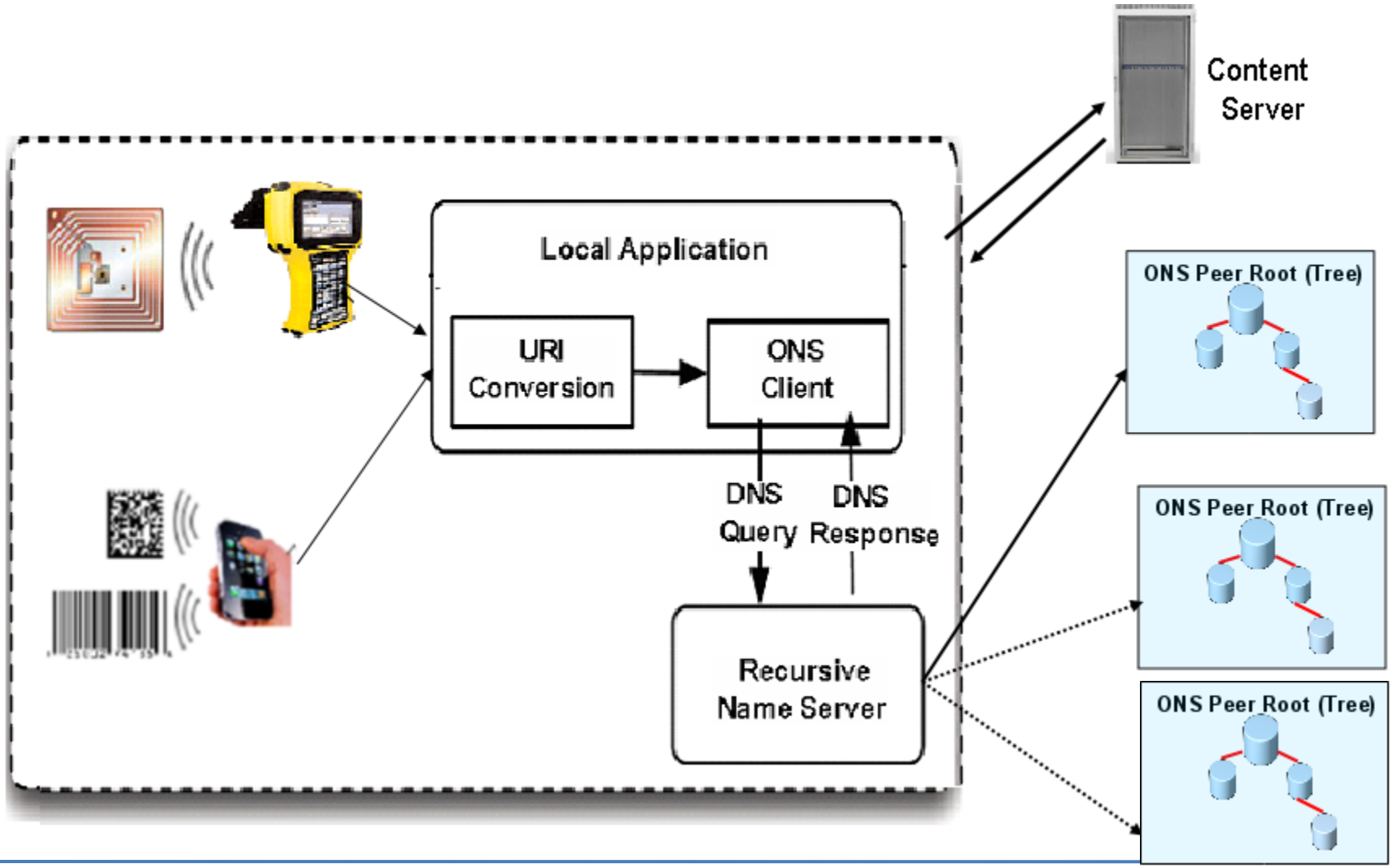
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0.0.0.sgtin.id.europeanroot. IN DNAME 0.0.0.sgtin.id.americanroot.

0.9.6.sgtin.id.europeanroot. IN DNAME 0.9.6.sgtin.id.asianroot.

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F-ONS, How it works?

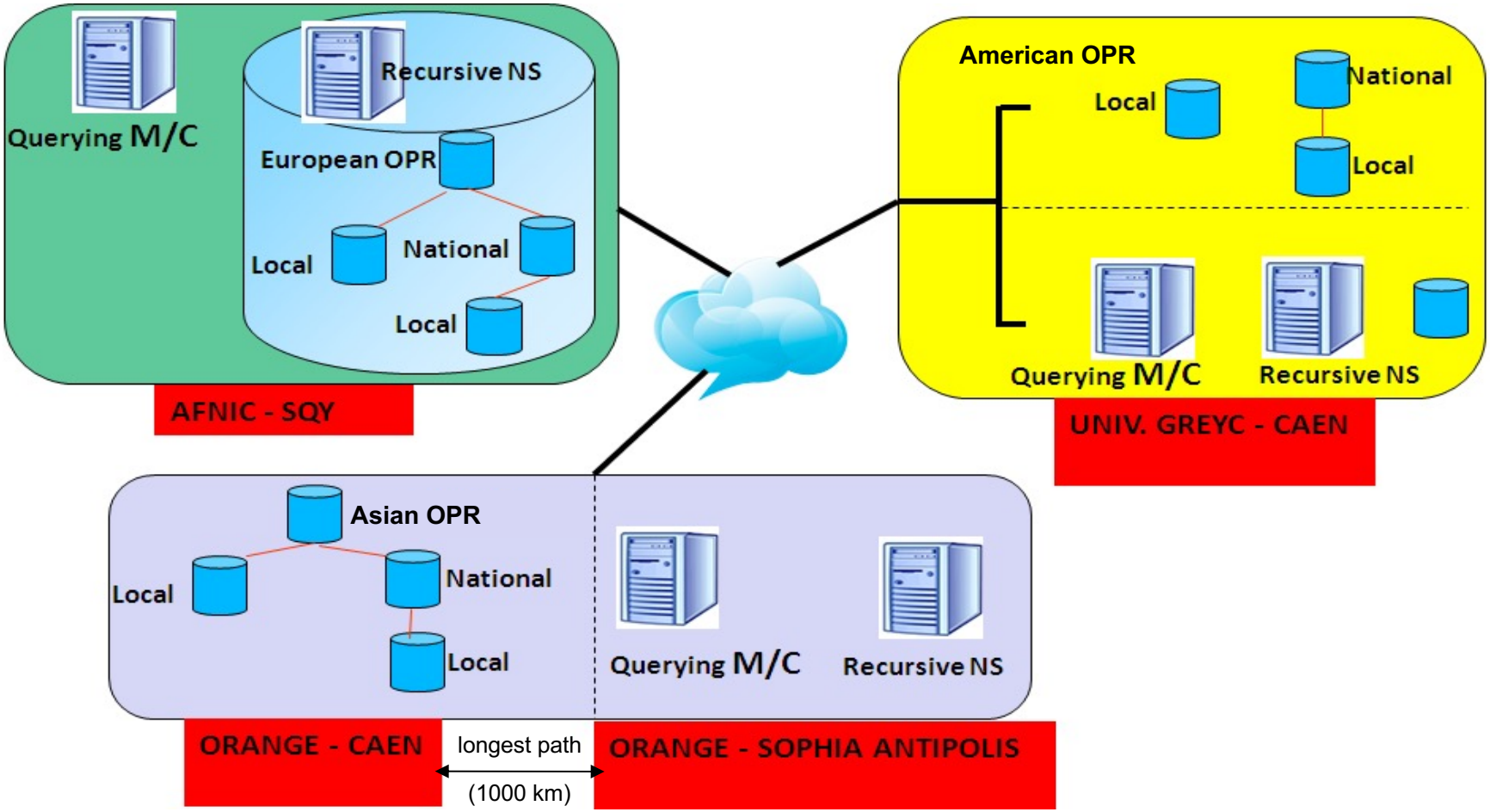


Conformity with F-ONS requirements

OK Study in progress

#	FONS requirements	DNS-based F-ONS
1	Neutral technology	
2	Granularity of Federation	
3	Granularity of Identification	
4	GS1 MO selection of peer	
5	Operator credentials/service level	
6	Interconnection/Transparency	
7	Updates	
8	Identification key carrier agnosticism	
9	Accommodation of non-GS1 identifiers	
10	Uniqueness	
11	Security and Information integrity	
12	Peer transparency	
13	Transition transparency	
14	Dynamic service definition	

Quantitative Tests (Architecture)



Quantitative Test Overview

- Metrics « throughput » and « delay » are measured
  - Throughput is measured at the recursive NS, to calculate how much load it is capable of handling
  - Delay (latency) is measured at the client end, to calculate the delay between a query and its response.
- Tests were run with four different scenarios on each F-ONS site:
  - Scenario 1 : Without DNAME redirection (no root interconnection)
  - Scenario 2 : DNAME redirection (measure impact of query redirection)
  - Scenario 3 : Moving a GCP delegated directly under the OPR for national level delegation
  - Scenario 4 : Moving a GCP delegation from one OPR to another

Tests Conclusion

- DNS based F-ONS architecture should support the load envisioned for a mid term goal with minimum performance loss
  - The functional tests satisfies most of the requirements highlighted by the EPC ad hoc ONS requirements committee
  - F-ONS can be set up quickly using existing DNS software and implementations
- But we need to compare it to real-world and P2P alternative
  - No possible « real-world » testing without large quantities of records & users
    - servers should be provisioned with real records and tested globally to understand possible performance issues
  - Ongoing P2P-based tests; results and comparative benchmark to come

Agnostic to Other Identification Schemas

- The F-ONS platform has already been tested with barcodes
- The F-ONS platform could be agnostic to other identification schemas such as :
  - ISO OID
    - urn:oid:1.0.15961.12.1 $=>$ IATA - Baggage Identification Number (BIN)
    - 00176367789 $=>$ Unique BIN for a flight HKG-DBX-LGW
    - Could be converted as : « urn:oid:1.0.15961.12.1.00176367789 »
    - And then « 1.0.1.5.9.6.1.1.2.1.0.0.1.7.6.3.6.7.7.8.9.oid.ons-peer.eu » as follows
  - Similarly for uCode.

Call for Participation & Conclusion

- The F-ONS platform satisfies the high level governance/technical requirements of the EPC ONS requirements ad hoc committee
- Industrial participation is needed to evolve the standards
- The platform needs to be provisioned and experimented by real user data for quantitative validation
- Need to reuse the know how for further experimentations
- Need to enlarge the scope of the F-ONS platform by testing other use cases of IoT
- For further details about the DNS-based tests « http://wings-project.fr/index.php/PmWiki/ProjectDeliverables » - D2.1 & D3.1