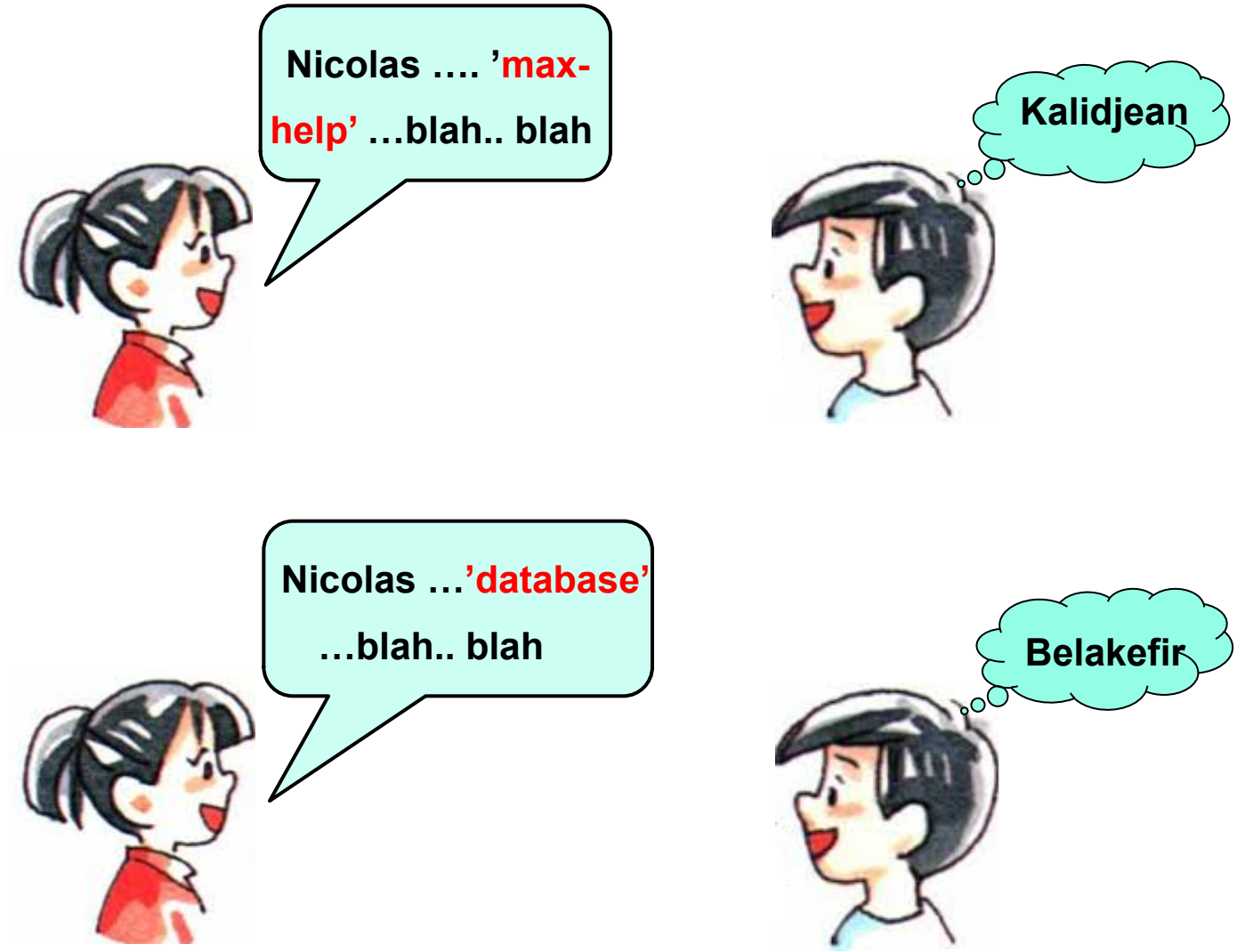


Need for a glue in Internet of Things

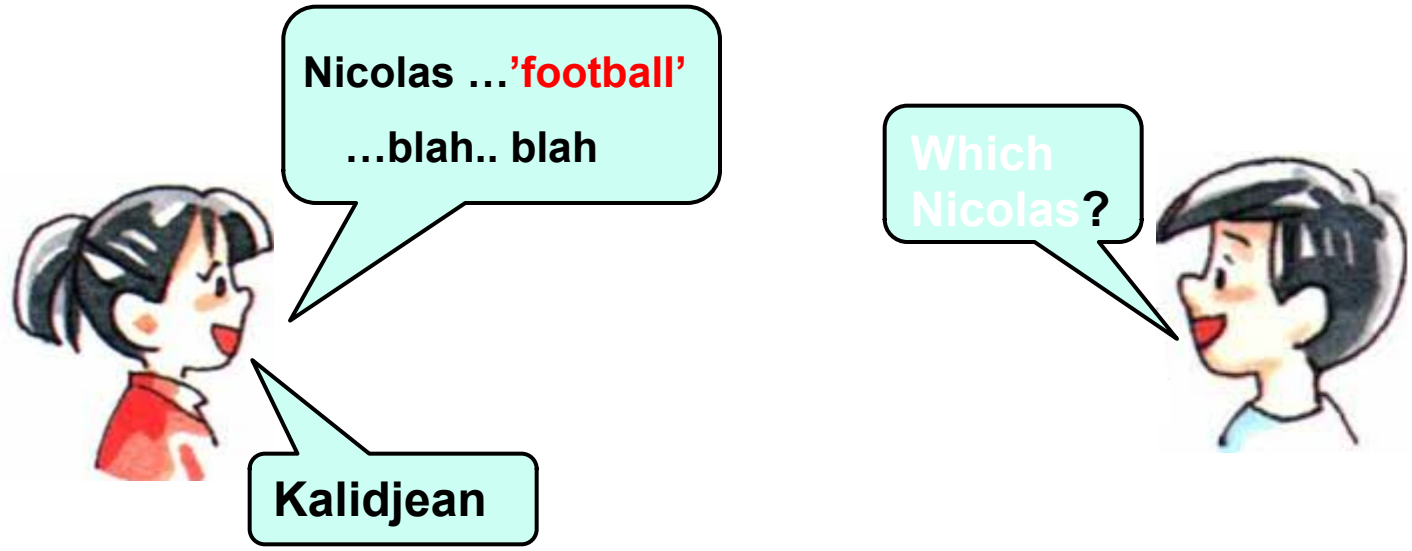
11/09/2015



A discussion between two employees at Afnic



A discussion between two employees at Afnic



Computers



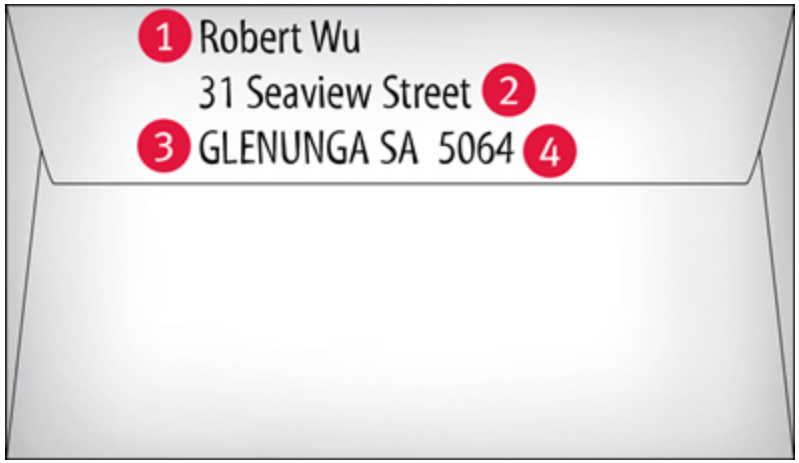
Some Terminology

- Identity – an entity definable and recognizable
  - “Sandoche-host“ is my computer´s identity
- Identifier – A single entity can have several unique identifiers
  - How my computer is identified (E.g my computer has wired IPv4 ans wireless IPv6 address)
- Address
  - Address & identifier can be same
  - They could be different (e.g a Shipping container fitted with a sensor)
- Resolution – Resolving a name to its address which could have information

Adressing Uniquely

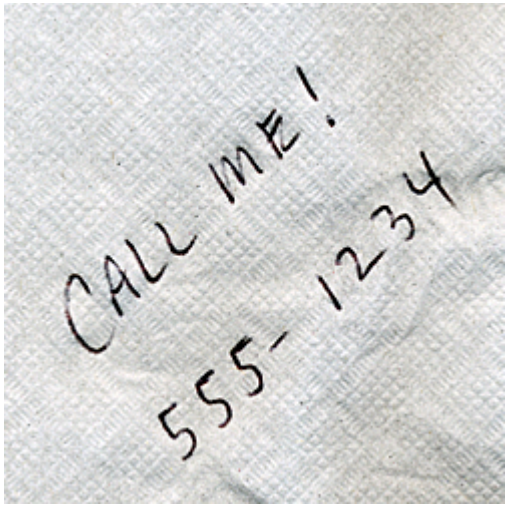
- Wired & Wireless communication uses IP addressing
- PSTN uses telephone numbers for communication
- Mobile handsets are identified by IMSI number stored in the SIM
- How are the things addressed uniquely?

Adressing Uniquely



Identifiers we use every day







Identifier Hierarchical Structure

- ✓ IP addresses : 129.113 7.156
  - ✓ Prefixes – IANA, RIRs, ISPs
  - ✓ Hosts – Configured by the network administrator
- ✓ Telephone numbers : 33 1 39 30 83 00
  - ✓ Country Code – ITU
  - ✓ National Destination Code
  - ✓ Subscriber Number
  - ✓ Domain names : www.afnic.fr.
  - ✓ Unnamed Root – IANA
  - ✓ TLD - Registries
  - ✓ Domain holders

What is a thing(1/3)



Identifiers for devices associated with « things » (2/3)



Hierarchical structure for device Identifiers associated with « things » (3/3)



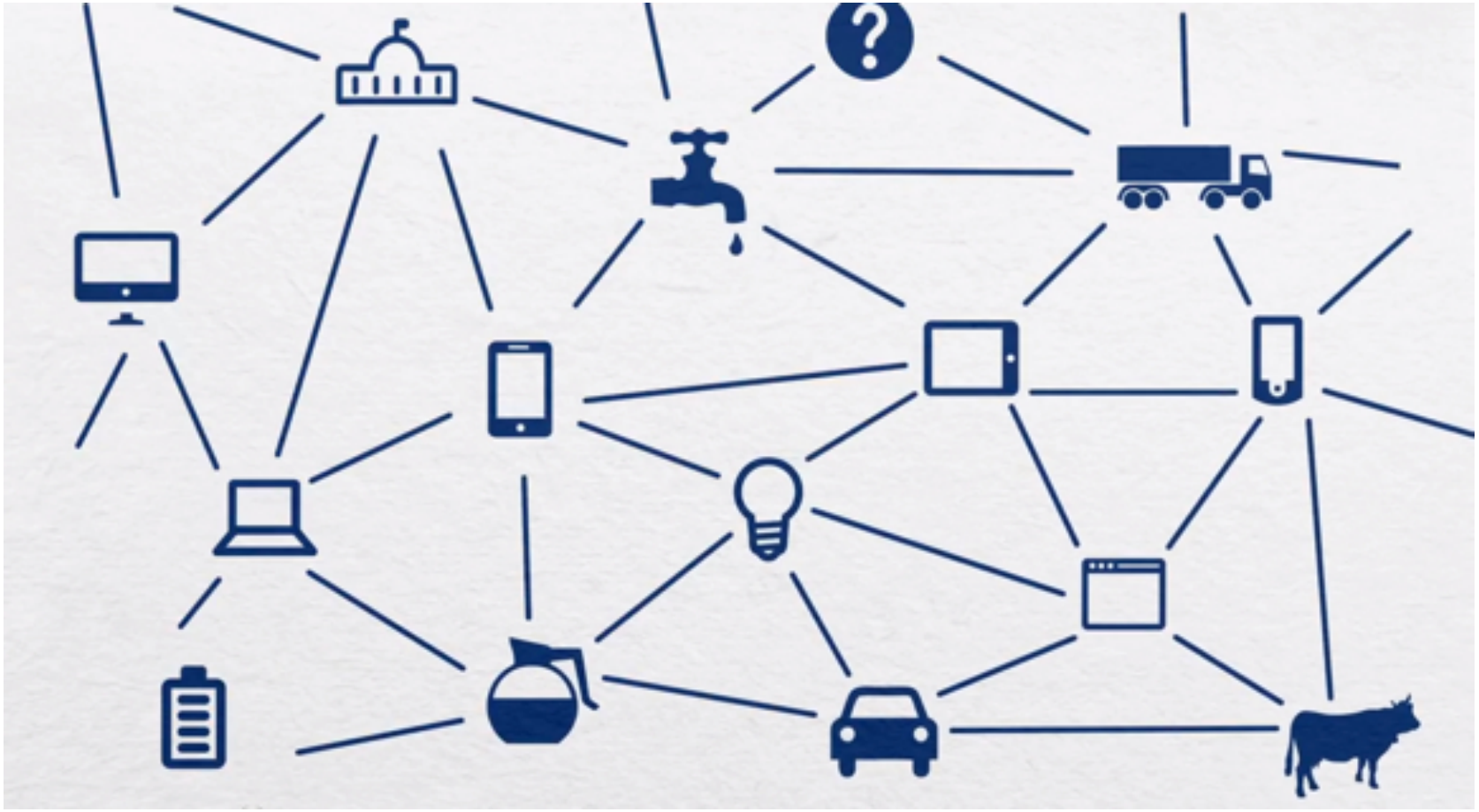
01.0000389.000162.000169740

Header	Company Code	Product Code	Serial Number
8 bits	28 bits	24 bits	36 bits

2001:0db8:3c4d:0015:0000:0000:1a2f:1a2b

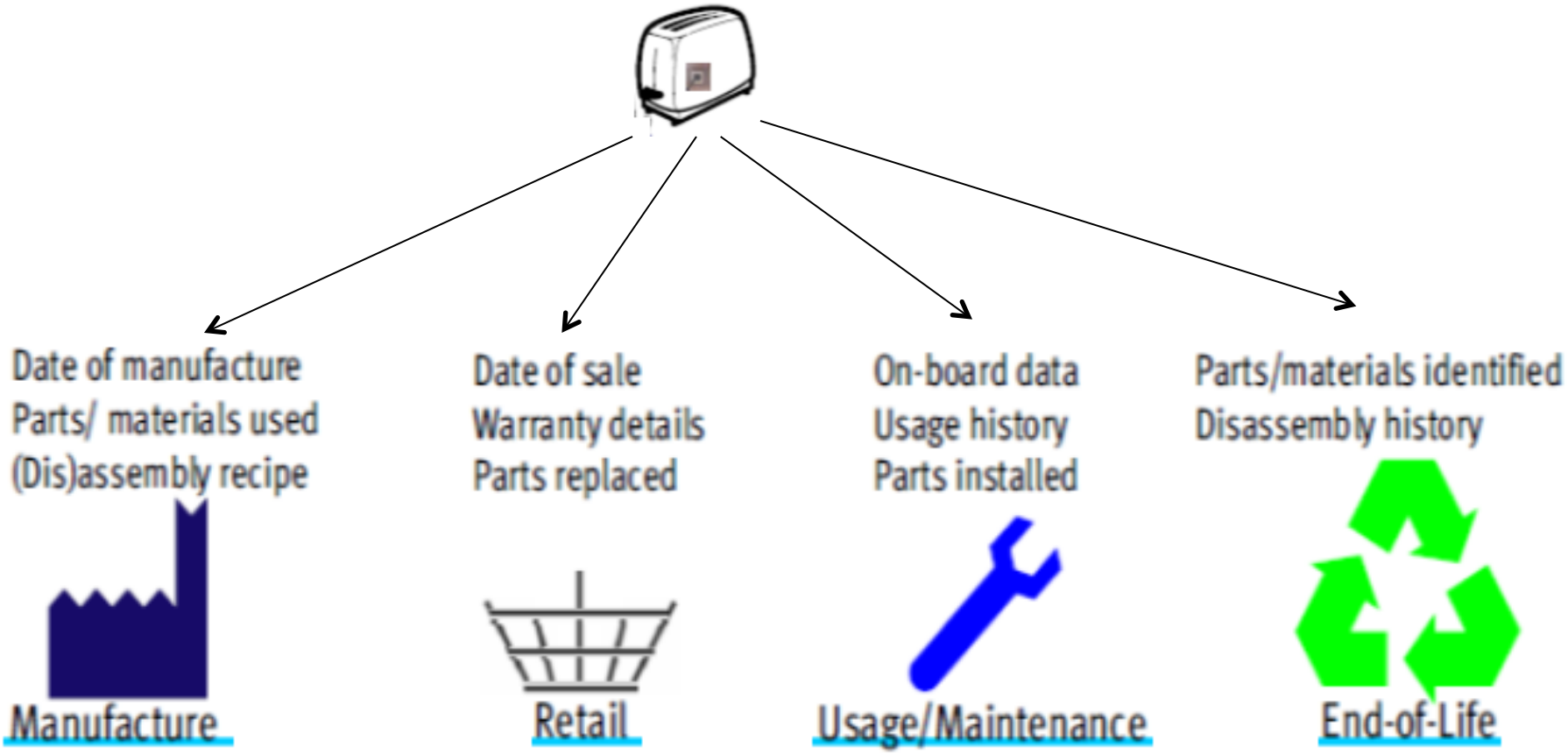
Site Prefix	Subnet ID	Interface ID

Need = I(Internet)oT



IoT use cases

Supply chain industry



Extended Packaging

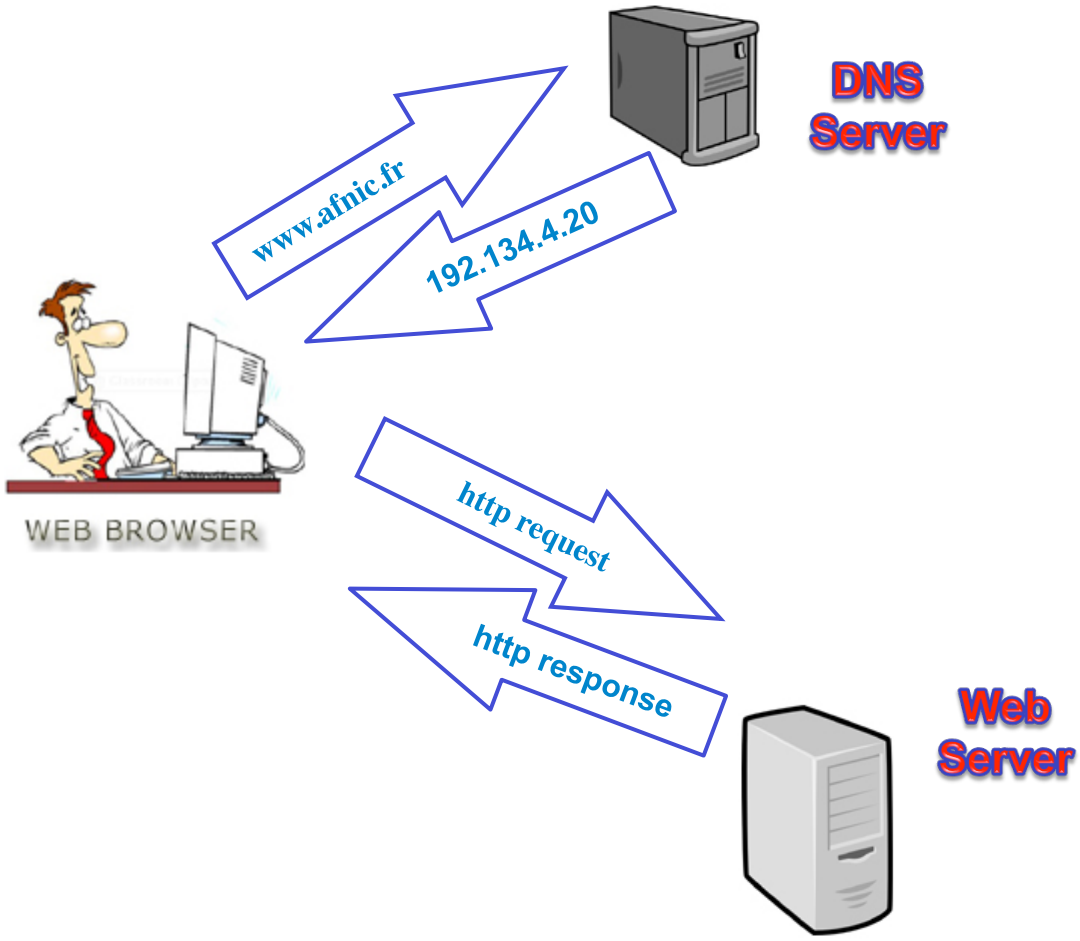


Extended Packaging Information

Smart home


72
Home Control
Energy
Thermostats
Notifications
Modes
Devices
Cameras

DNS – The « glue » in Internet



Extended Packaging

EPC Usage

→ GTIN
(GTIN-8, GTIN-12, GTIN-13, GTIN-14)



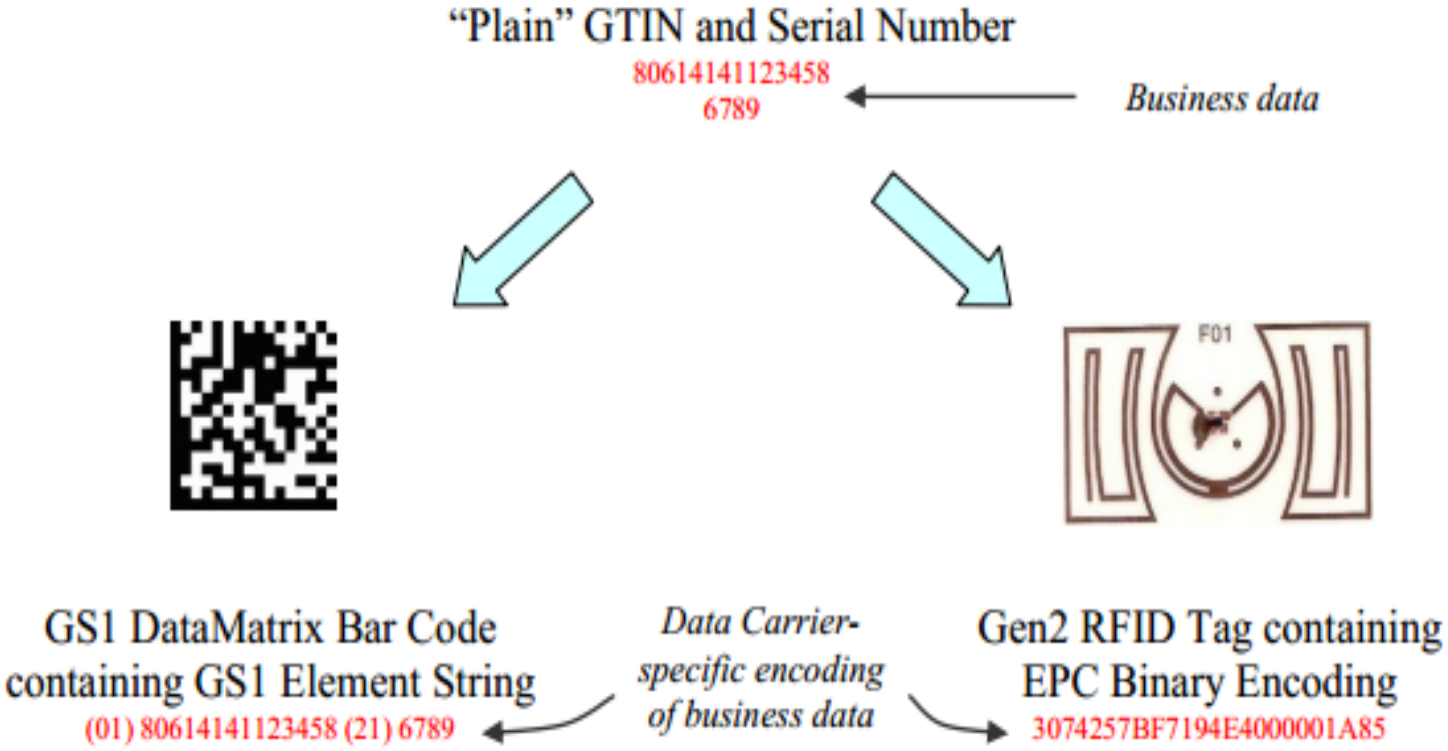
→ SSCC



→ GLN



EPC encoding in different carriers



EPC Allocation

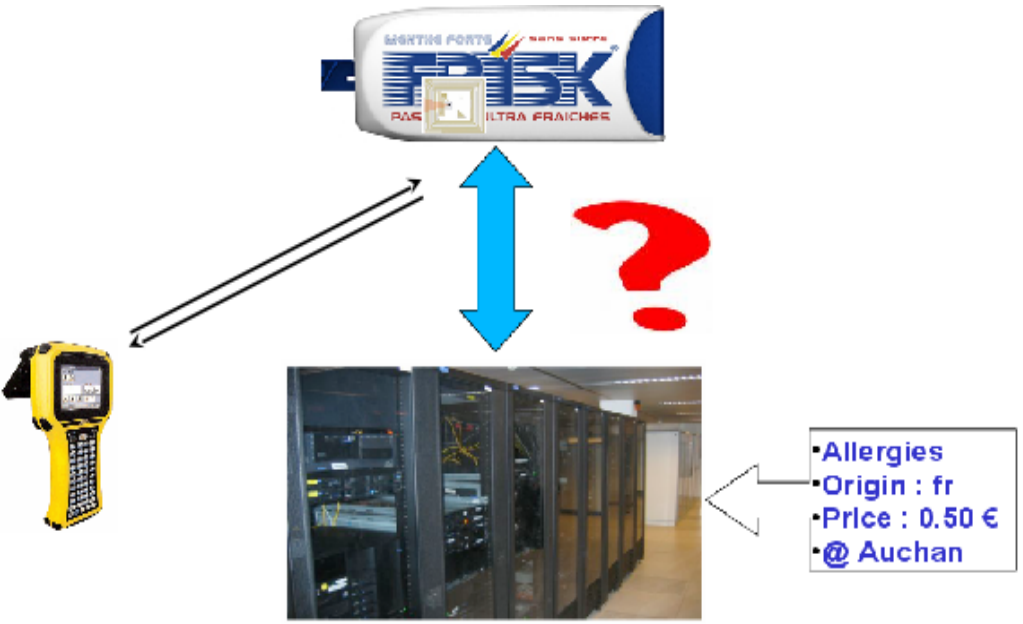


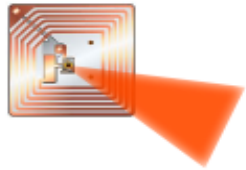
1. GS1 Japan allocates GS1 Company Prefix to musicians.

2. Musicians allocate GTIN -13 to each song and apply to iTunes Store for registeration with GTIN-13.

3. iTunes Store manages their database in 14-digit capacity.

DNS – Could be the « glue » in IoT





(EPC)
300 9345.678908.2343

Country code
Company code
Object ID
Product unique serial number

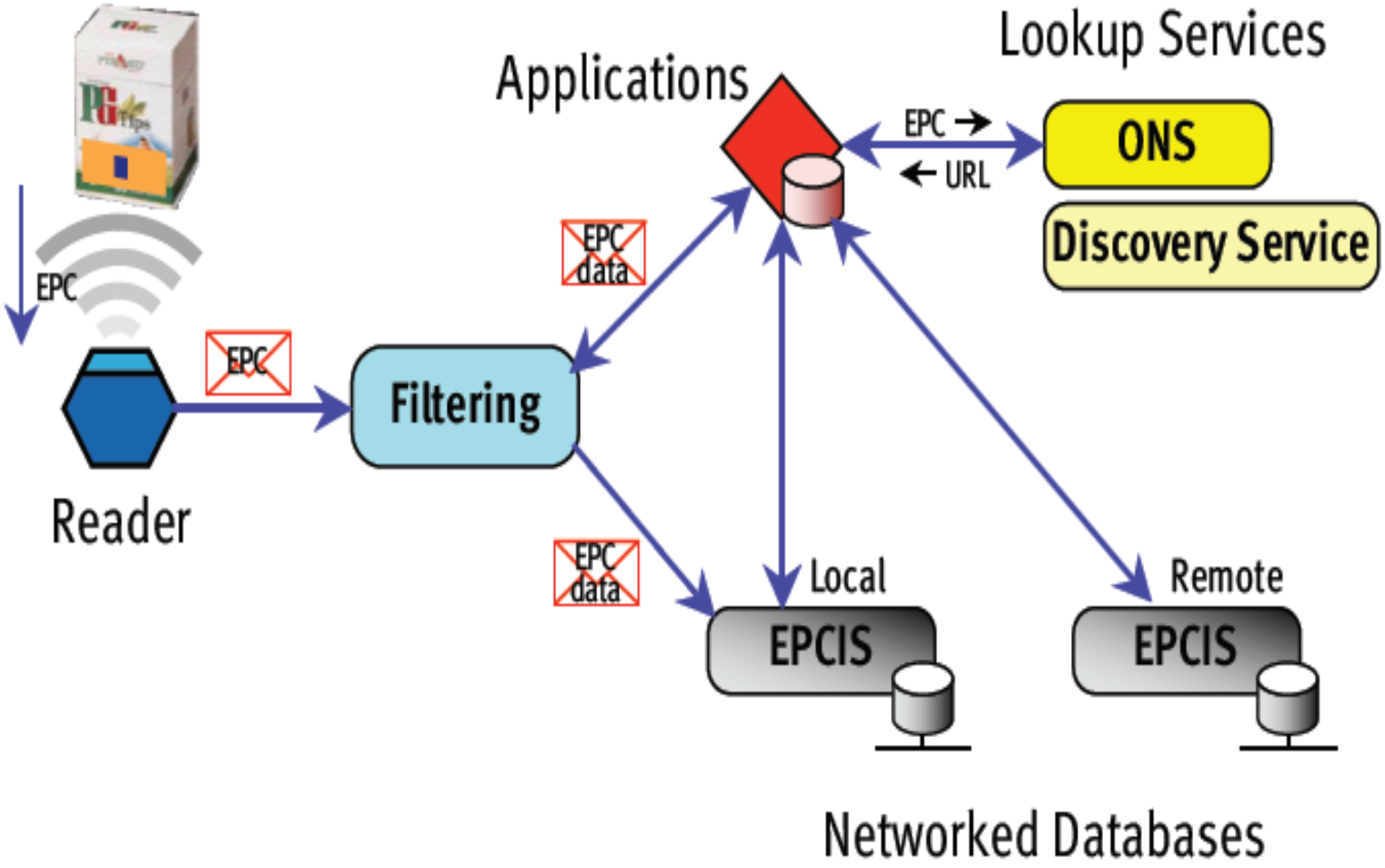
(URN) urn:epc:id:sgtin:3009345.678908.2343

(Domain Name) 678908.3009345.sgtin.id.onsepc.com

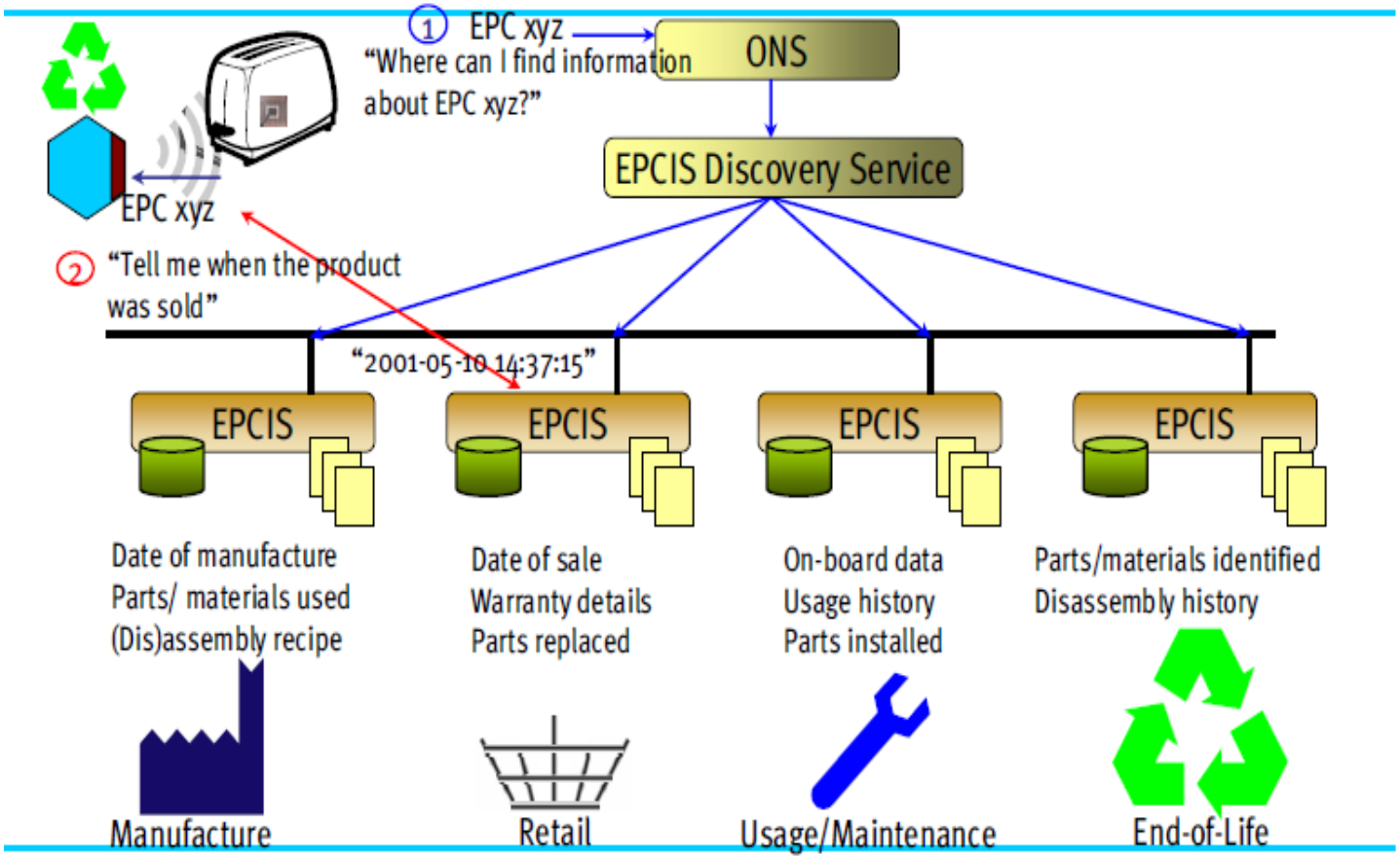
(Domain Name) 8.0.9.8.7.6.5.4.3.9.0.0.3.sgtin.id.ons-peer.eu

Supply Chain Industry

EPC network


Lookup Services
Applications
EPC
URL
ONS
Discovery Service
EPC
data
EPC
EPC
Filtering
Reader
EPC
data
Local
Remote
EPCIS
EPCIS
Networked Databases

EPC Use Case


1 EPC xyz
"Where can I find information about EPC xyz?"
ONS
EPCIS Discovery Service
EPC xyz
2 "Tell me when the product was sold"
"2001-05-10 14:37:15"
EPCIS
EPCIS
EPCIS
EPCIS
Date of manufacture
Parts/ materials used
(Dis)assembly recipe
Date of sale
Warranty details
Parts replaced
On-board data
Usage history
Parts installed
Parts/materials identified
Disassembly history
Manufacture
Retail
Usage/Maintenance
End-of-Life

Comparison between WWW vs EPC Network

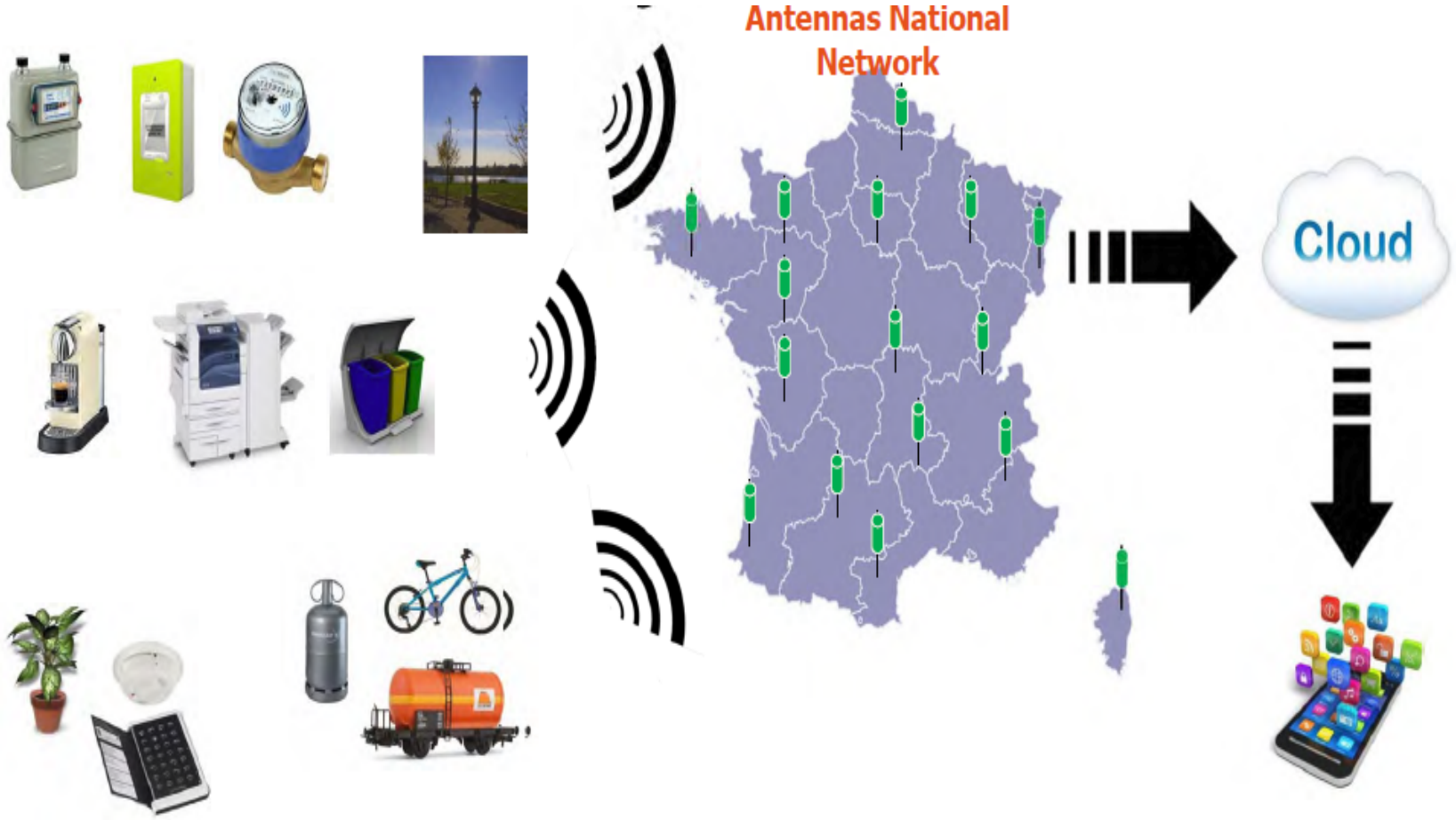
World Wide Web	EPCglobal Network
DNS Authoritative system that routes requests for Web sites and email	**ONS** Authoritative record of manufacturers that routes requests for product information
Web Sites Resource that contains information on a particular topic	**EPC Information Services** Resource for specific information about a product, e.g. date of expiration
Search Engines A tool for finding Web sites on the network	**EPC Discovery Services** A tool for finding EPC Information Services on the network

- Now we understand why we did study DNS

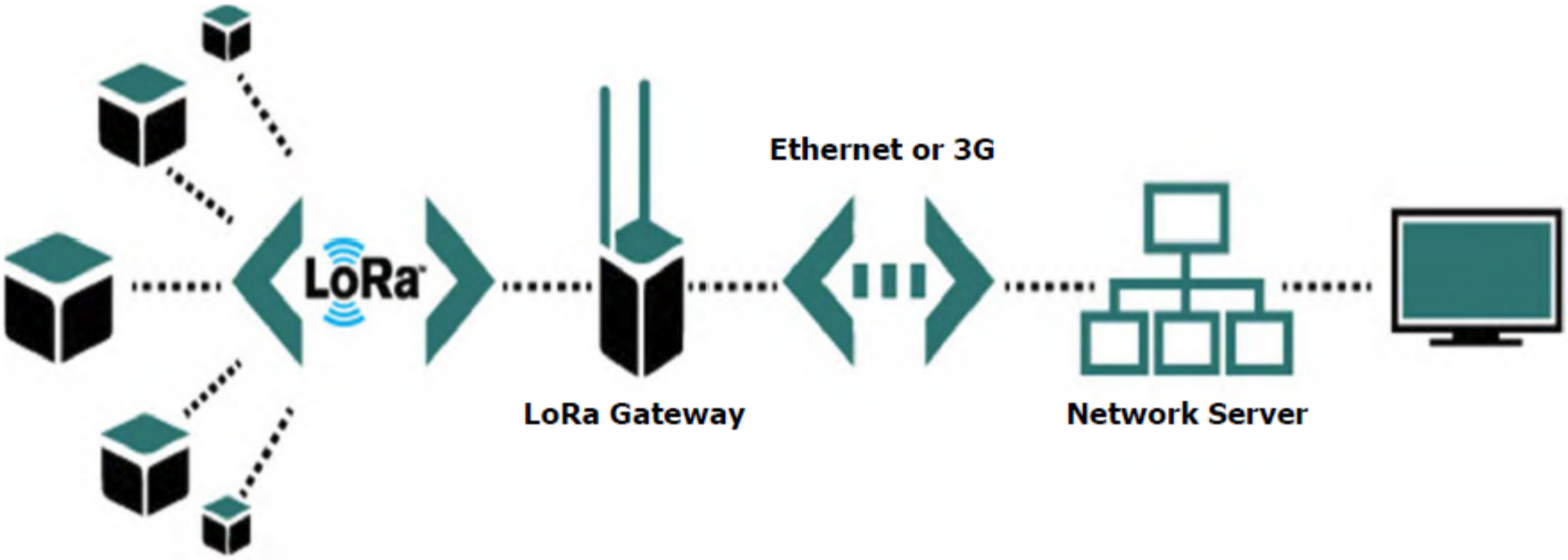


In the Sensor World

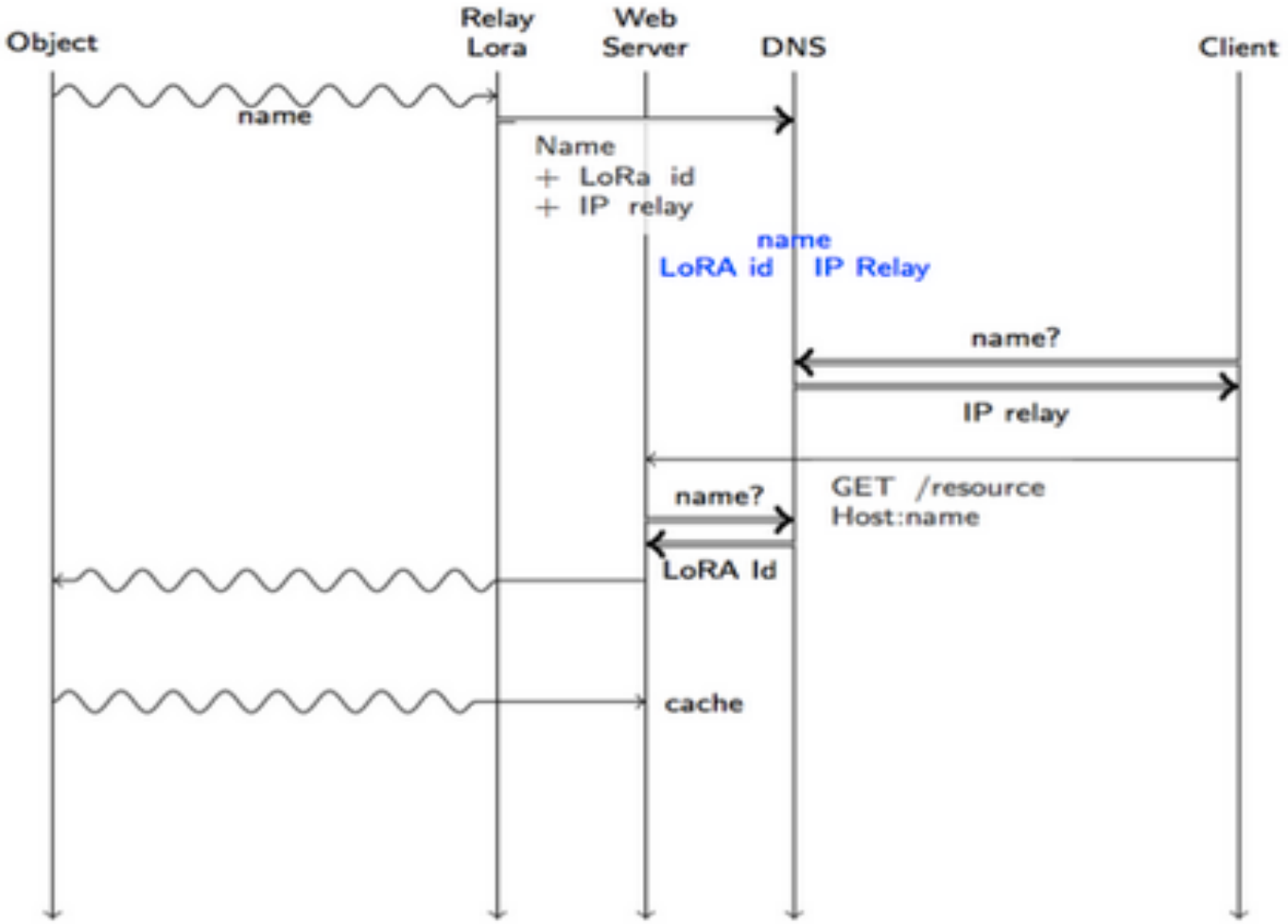
IoT Long Range network



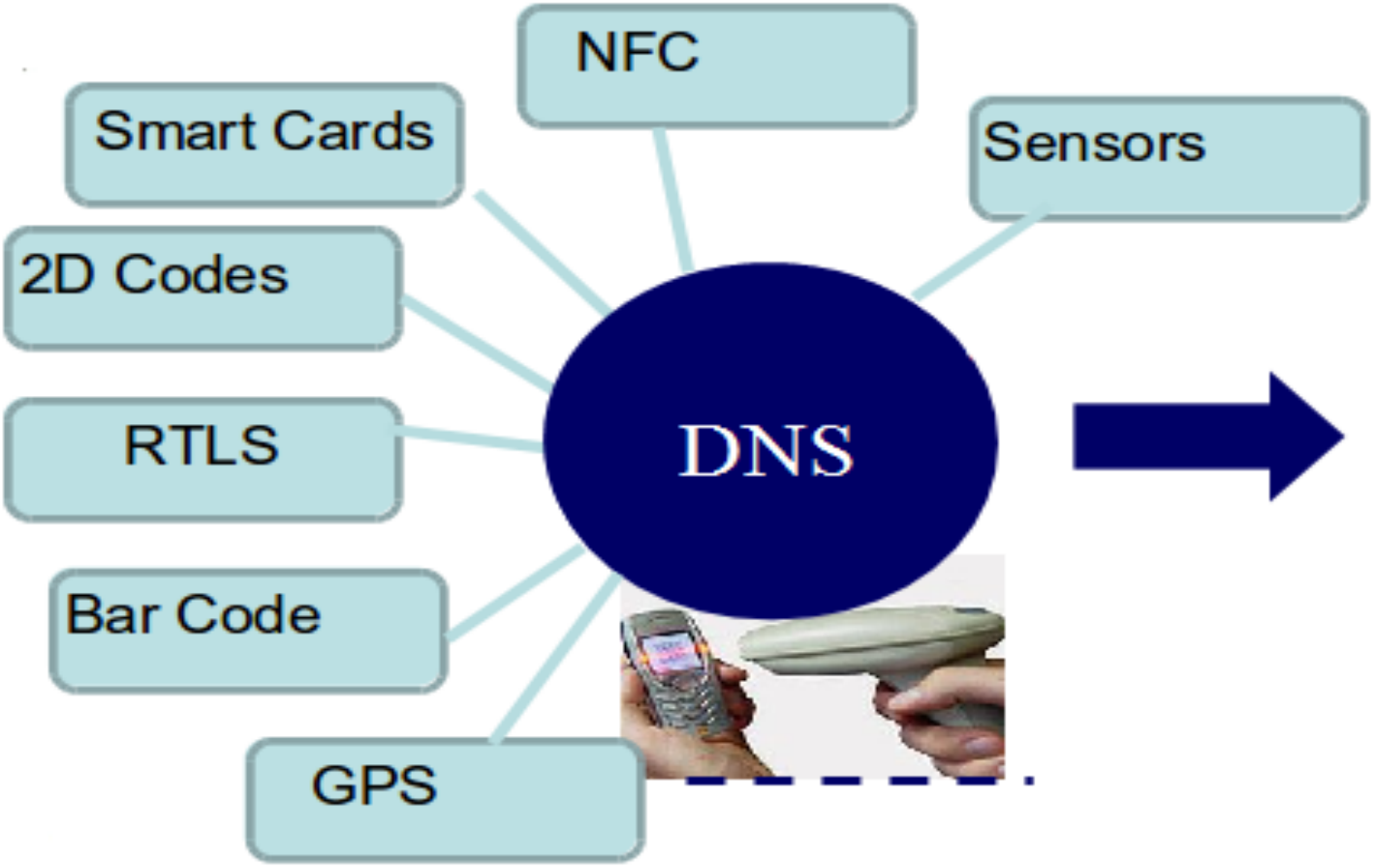
LoRA Setup



Resolving using DNS



Vision



Merci !

www.afnic.fr
contact@afnic.fr
Twitter : @AFNIC
Facebook : afnic.fr