

Internet of Things : ***A twin challenge for regulation ?***

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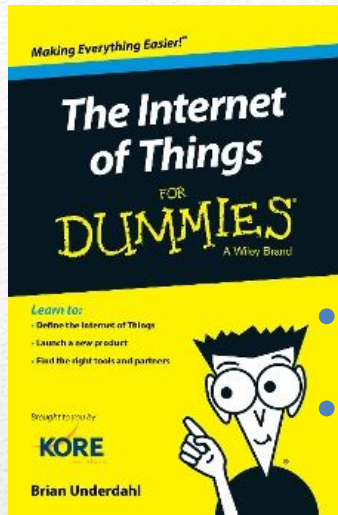


IOT : AN EMERGING ISSUE

What are we speaking of ?

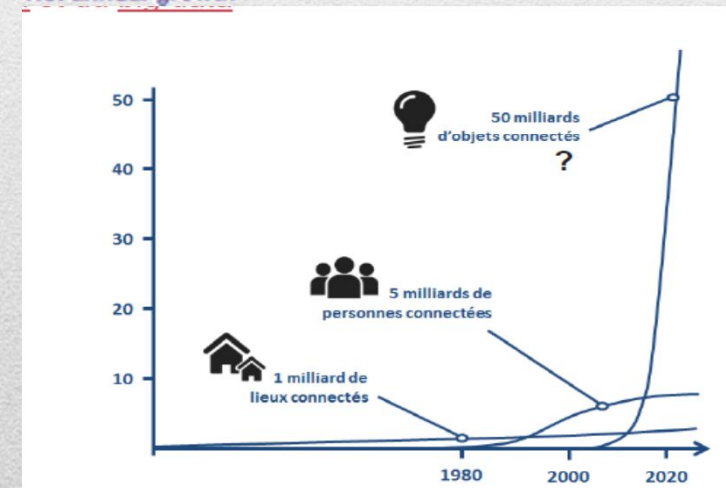
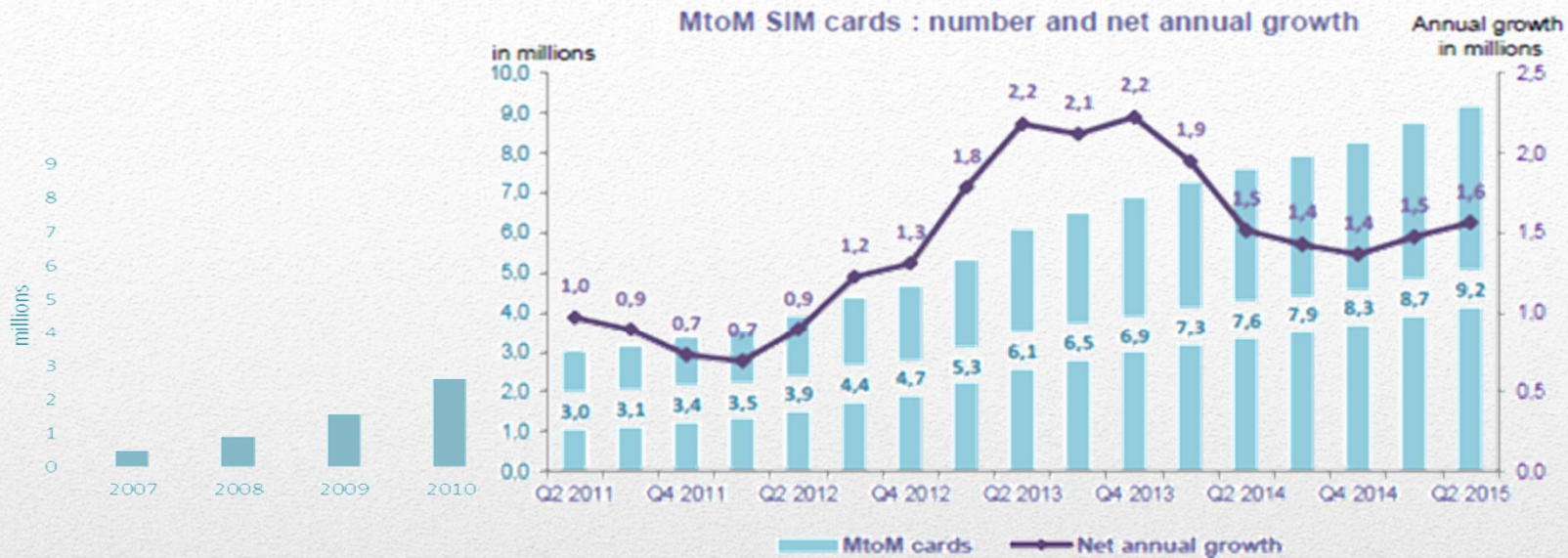


- *Generalized interconnection*: any object communicates, can be queried, sends information, interacts
 - *An extension of the Internet* : technically, a network of networks which enables to identify digital entities and physical objects :
 - *A new resource for innovative services*
 - *At the end of the day, alternative visions*:
 - Internet-oriented
 - Available infrastructure, processes, actors
 - Thing-oriented
 - Traceability, addressability, sensor networks
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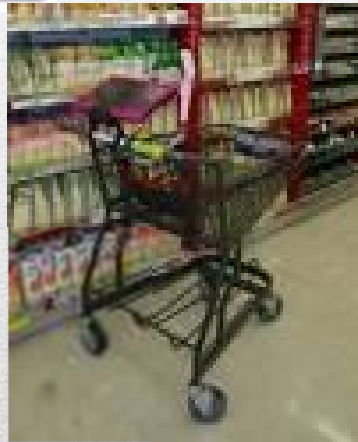
IoT = the future of the internet ?

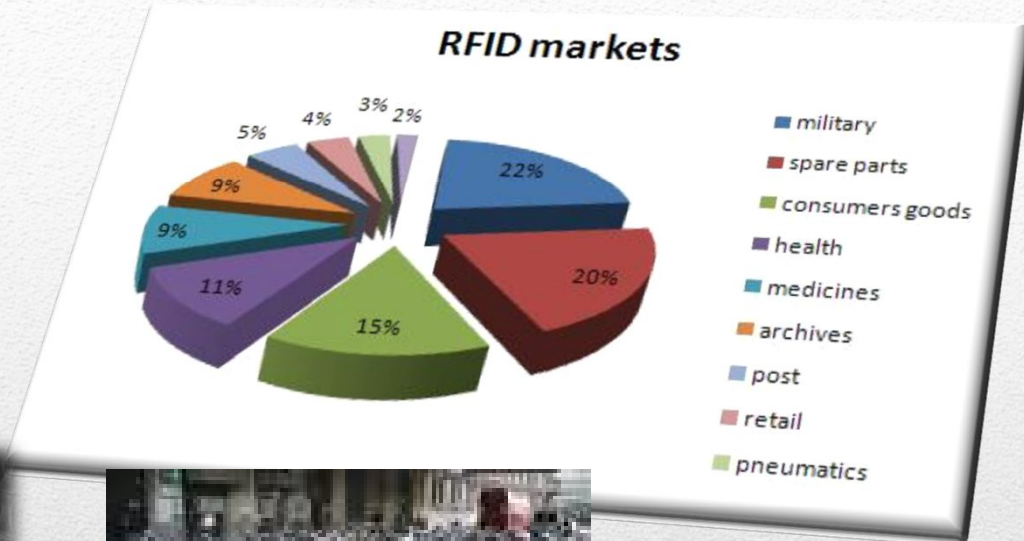
- Coined in 1998
- A mean to support industrial policy strategies
 - To get back into the game of the internet
 - R&D programs all over the world
 - Europe , Korea, Japan , China, India, US ...
- Complementary technological paths :
 - Not a single technology but a system of system and an technical ecosystem
 - Pervasiveness
 - Shared interface
 - From early B2B to massive applications (smart meters, animals, health...)
- Addressing major socio-technico-economic trends
 - From product to services
 - From fixed to mobile technologies
 - Articulating clic and mortar
 - Structuring smart networks and ecosystems



An impressive growth

A new playing field for innovation





Supporting a large range of applications

Type of system	Identification	Sensors	Connection	Integration	Data processing	Networks
Stakes	Identifying each object in a unique way and retrieving data stored in the object	Collecting information in the environment to enrich the functionalities of the systems	Connecting systems between themselves	Integrating systems for data to be transmitted from one layer to another	Storing and analysing data to launch a process or ease decision-making	Transferring data to and from physical and virtual worlds

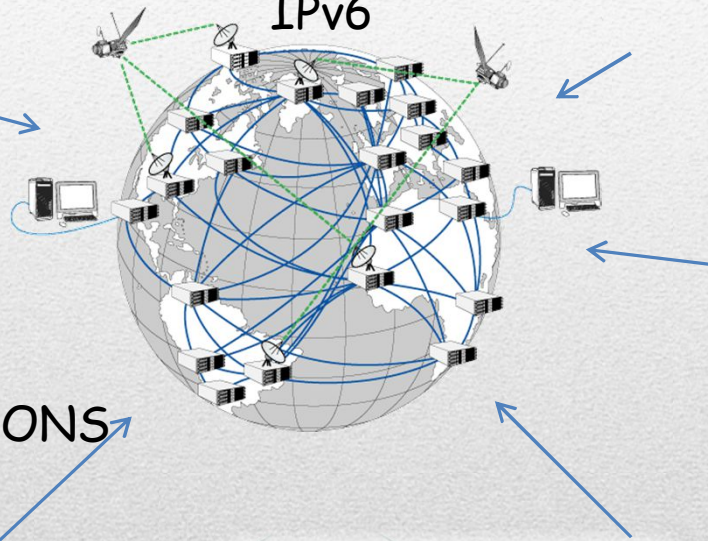
Articulating a system of systems

Mobilizing a network of converging networks



Data matrix

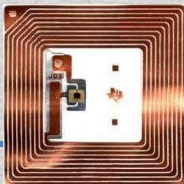
Internet :
IPv6



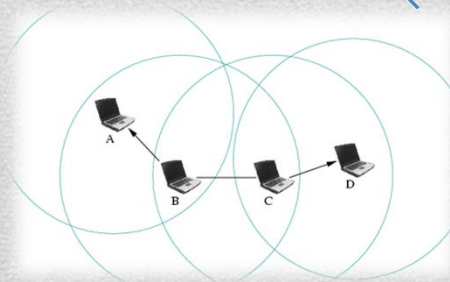
GPS
Mobility



ONS



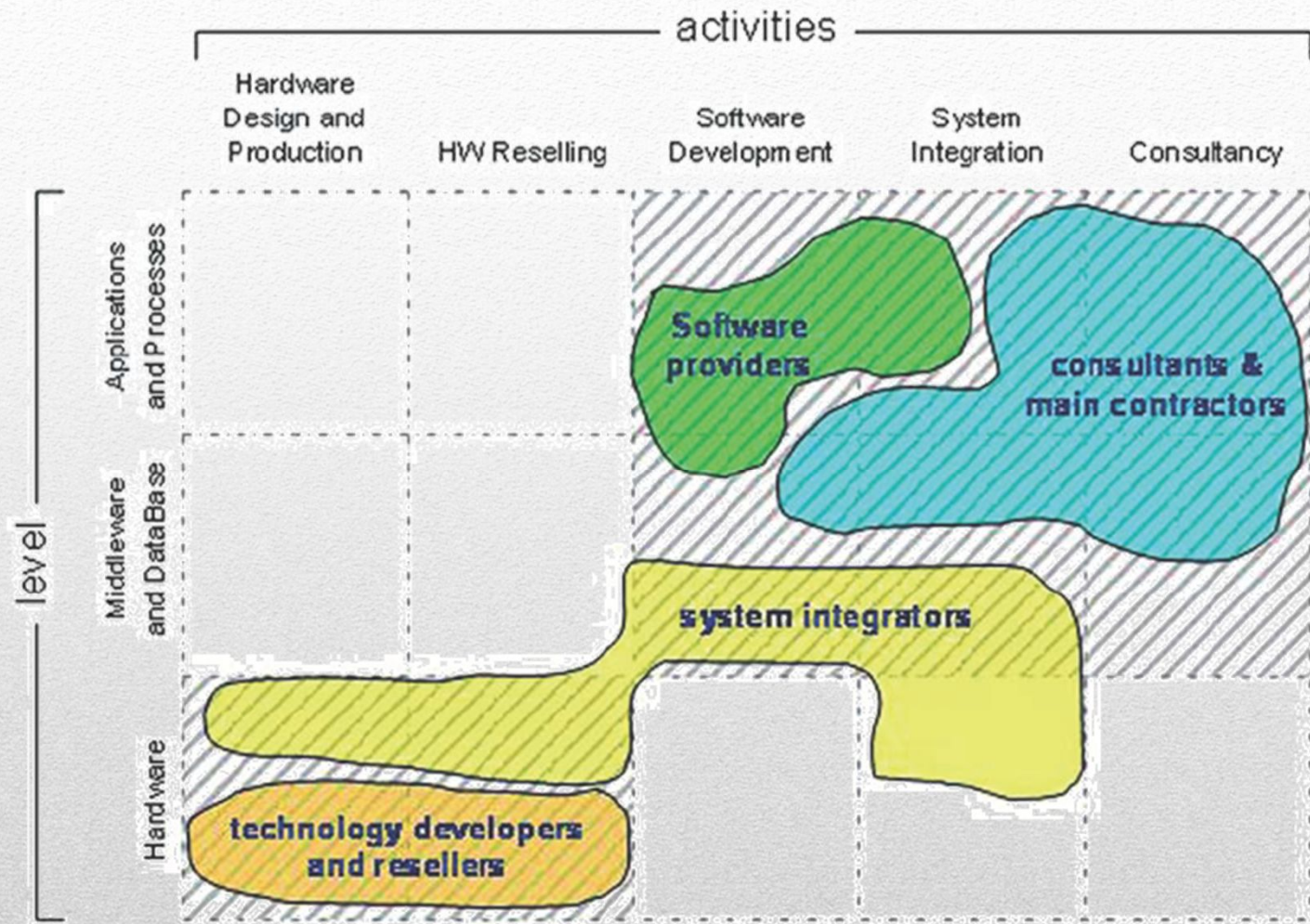
RFID, tags
& readers



ad hoc networks

Sensors





A multilayer value chain



ECONOMIC FRAMEWORK FOR REGULATION THINKING

Distinctive innovative processes in the internet

- An unlike wave of (generic) technology
 - Flexible technologies supporting various projects
 - Incremental v. disruptive, evolution or digital revolution
 - New economic and organisational designs
 - Conceiving Business model + uses + applications + technology
 - Restructuring the value chains
 - Competition from outside ICT sectors and from various layers
 - Acceleration and globality of the conception process
 - Various paces of innovation to master
 - Valuating new set of resources
 - A situation emphasized in/by the IoT
-

New economic models and value chain

- Financing are based on different actors
 - Operators and technology providers: to prime the market
 - Industrial intermediaries and platforms : Performance + New services
 - Consumers and end users for new value-added services
 - Some kind of "paradox"
 - Risk of commoditization preventing differential strategies and gains
 - Emergence intermediaries linked to the standardization of information
 - Unpublished roaming issues (motorway transport, health, DRM)
 - Transformation of markets and value chains
 - Complexity of the specific value chain
 - New strata in existing industrial sectors
 - Transverse intermediate competing technologies
 - New market reconfigurations associated with interoperability
-

- Economic of infrastructure (fixed costs) + economic of data
 - Articulating the capture and data processing flow
 - Involving specialized actors and stakeholders
 - Trade off between efficiency + performance and protection
- High value added + Low cost implementation
- « Platform » for innovation
- B2B / B2C and value internalized by users
- Variety of business models

Rethinking the economic digital framework

The economic questions at stake

~ What performance?

- Variable performance factors according contexts (quality, prices...)
- Integrated cost in an industrial process
Communication costs (fixed and mobile) and terminals (PC, mobile phone)
Increased efficiency of industrial processes companies
Improving the quality of services

~ Who should invest and why?

- Traditional firms vs new entrants
- Initial investment and ROI ; Business applications and daily operations
Hidden costs implementations

~ What are the Business Models

- Redefinition of the value chains
- Various sources of productivity and performance
- Improved performance for consumers
- New services for consumers
- New resources for efficiency

~ What demand from users' side ?

- Which market ? B2C or B2B ?
- Which suppliers ?

Not to forget the technical side : complex and evolving technological system

- Competing solutions - applicative and technological rivalry
 - Recent proliferation of LPWAN (Sigfox, Lora, Qowisio, Ingenu...)
 - Technology race before the arrival of 3GPP
 - Competitor alliances, consortia and vertical integration
 - Cisco acquires Jasper (cloud-based IoT service platform to launch, manage and monetize IoT services)
 - Google Thread alliance integrating Zigbee communication layer with Nest and bridges with other consortium such as Intel's Open Interconnect Consortium
 - Allseen Alliance (supported by Linux Foundation and Qualcomm) : an open source platform and open standard in order to support large equipment interoperability.
- Malleable and highly reconfigurable
 - Key technical functions
 - 1) identifying + 2) relays of local information (sensors, physical condition) + 3) records
 - structuring functions in the middleware:
 - Standardized and partially competing with other technical solutions
 - Legacy v. open infrastructure
- Main technological needs
 - Guaranteeing the performance of solutions in use contexts
 - Ensuring the durability of solutions
 - Conceiving an efficient data management system
 - Some specific bottlenecks (memory, privacy...)
 - standardization and interoperability = a key dimension
 - Dependence on existing standards.
 - Standards "granularity"

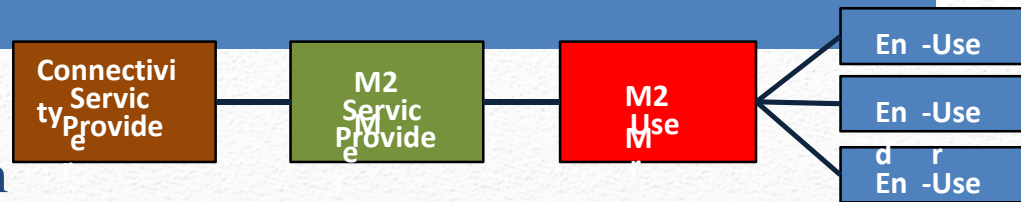


IOT : EVOLVING CONTEXT FOR A REGULATORY BODY AS ARCEP

- Overlapping of various regulatory bodies
 - Arcep, AdlC, CNIL, Hadopi, CSA, Arafer, CRE, Court of justice
- Various set of laws / actions
 - Competition, privacy, standardization;, sectoral authorities
 - Network design, congestion management and calibration
 - interoperability, and evolving technologies
- Actors to regulate
 - New comers
 - Growing numbers

Multi level action and governance

- From M2M to IoT
 - M2M Berec value chain
- Applicable regulatory framework
 - Cf. notification regime for M2M service providers and resale of connectivity by M2M users
 - International roaming for IoT
 - Amendment to allow permanent roaming
 - Connectivity, portability and e Sim cards for M2M
 - Deviate from basic principles of data protection
- Other regulatory issues
 - Interconnection and technico-economic network management
 - Platform dominance in control of data and unique playing field (cf. geolocation)
 - interoperability



Embedded in an European perspective (Berec)

- Twin challenge :
 - innovation and competition
 - Coherent and sustainable framework for connectivity
- Spectrum management
- Licensing
- Design of infrastructure (FttH e.g.)
 - A fertile ground with ISP ADSL boxes
- Numbering and portability
- Consumer protection
- Competition investment
- Innovation
- Coverage (non dense area : cf. agriculture)
 - A fertile ground with ISP ADSL boxes
- Connectivity (variable requirements for ping and latency)
- Interoperability and scalability
- Security and resilience

The main issues at stake

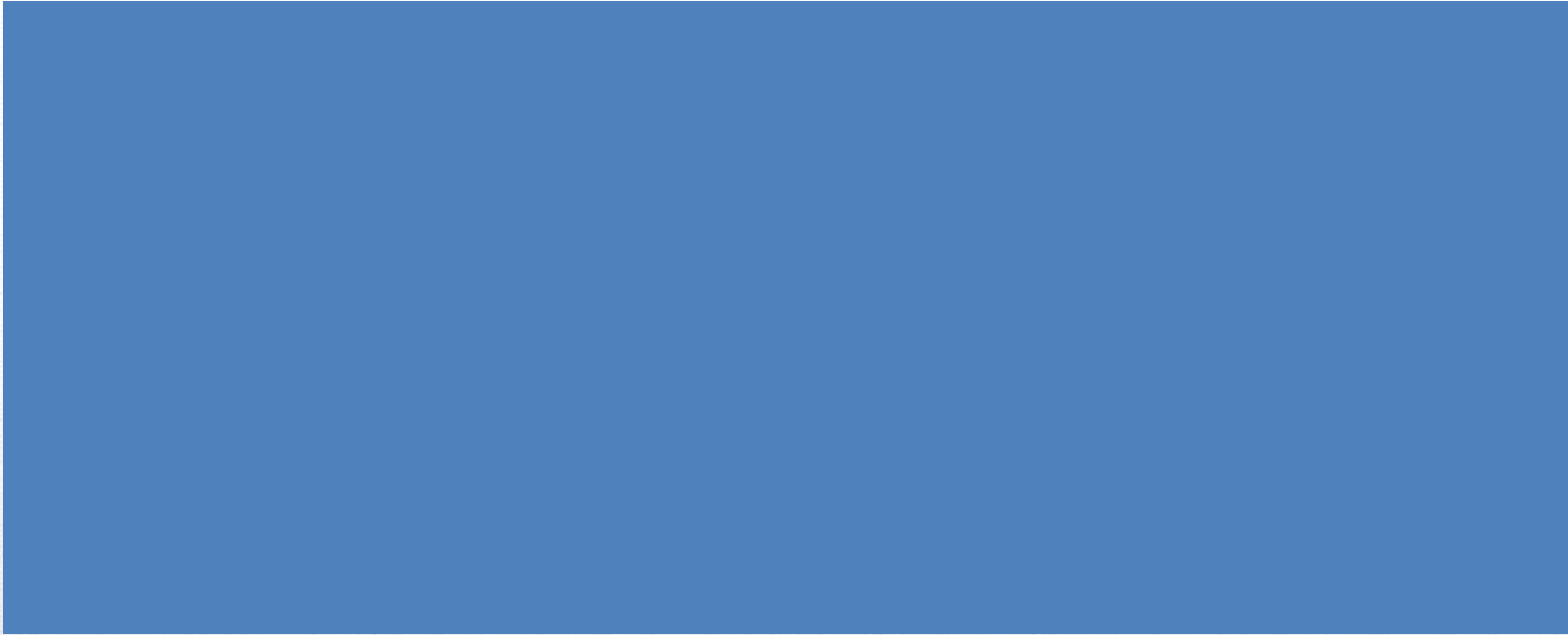
Innovation fostered by interoperability

- Interoperability is a crucial building block
 - increasing variety of applications
 - enabling emergence of niche-markets (long-tail)
 - articulating standard technical interfaces and P2P
 - allowing convergence of distinct systems in the open ecosystem of IoT,
- Interoperability reduces access barriers
 - to digital content
 - to a great variety of innovative services of any kind
- Interoperability enhances user autonomy
 - increases creativity and freedom of stakeholders and actors in the field
 - widen the range of choice for consumer

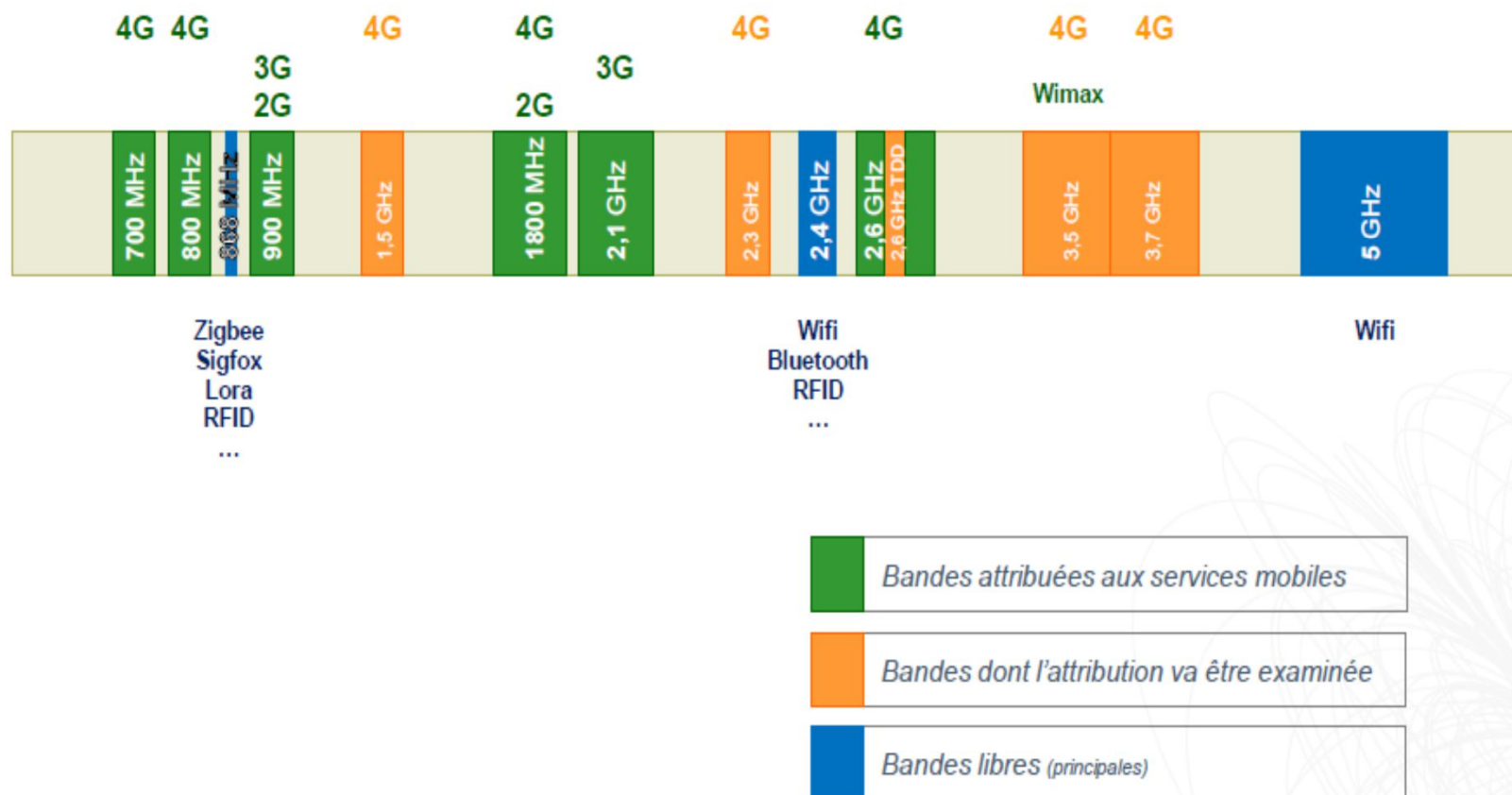


- Standard competition at different layers
 - From devices to software application and embedded operating systems, from contactless technologies to distributed servers and storage, interacting protocols, processing data platform and communicating objects
 - a limiting factor and a resource to consortium dominating strategies
 - Competition at each layer (cf. Sigfox / Lora)
- A space for International telecommunications bodies
 - ISO, ETSI, IEEE, IETF, IoT-GSI from ITU-T
- The question of Open system and standard granularity
 - API, to avoid market fragmentation
- Putting pressure over regulation
 - To prevent the risk of winner takes all and first mover advantage
 - To support Light hand regulation in order not to freeze the market and innovations (cf. spectrum allocation)

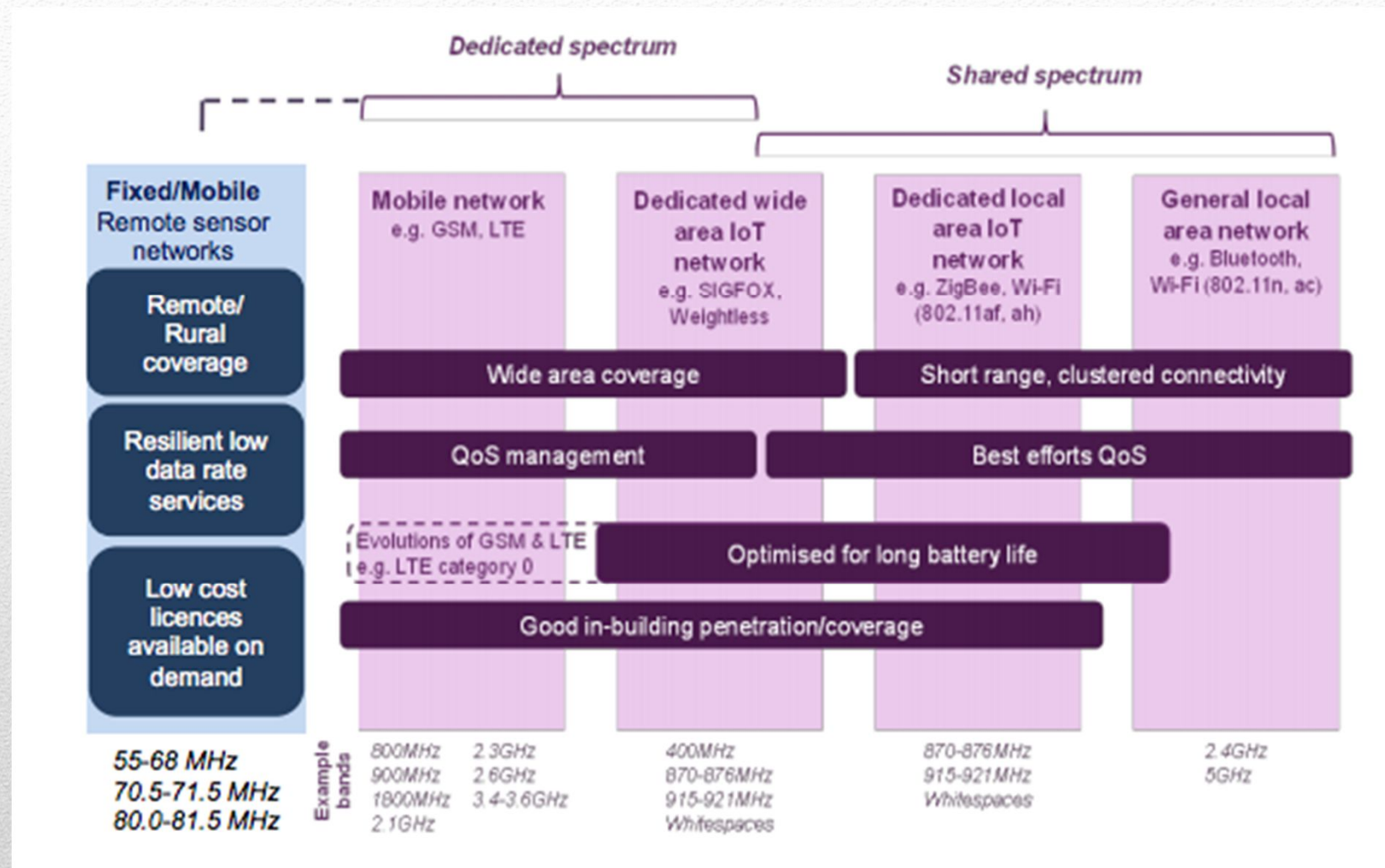
Standardization and interoperability



SOME ISSUES WITHIN AND OFF THE LIMITS OF NRA FIELD OF COMPETENCE



In : Spectrum management



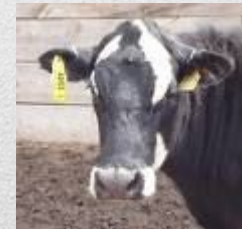
(Source : Ofcom)

Framework spectrum requirements

- Expected number of connected objects : a challenge for connectivity, addressing and numbering ?
 - A debated question
- International perspective for IoT uses
 - Extra territorial use of national numbers
 - Arcep decision to allocate a specific range of telephone numbers for IoT (preventing use of 10 digit mobile numbers, and instead 14)
 - Permanent international mobile roaming
- B2B and industrial perspective
 - IMSI Remoted programming Sim cards
 - FttH architecture and tariff

**In : connectivity, switching,
addressing, portability**

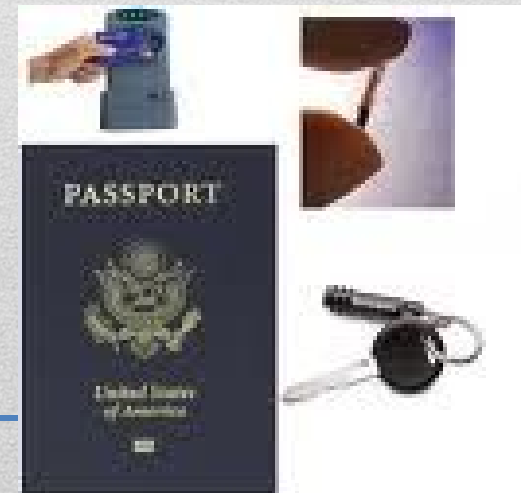
- Multifaceted risk
- M2M risks and liability
 - Environment
 - Logarithmic conflicts
 - Trust in informations
- Ethical concerns
 - From things to animal and individual tagging
 - awareness and education
 - Formal consent, withdrawing and forgetfulness
- Efficiency vs. Privacy
- Multiple identities, regulation
- A market for security and Privacy Enhancing Technologies



Off : privacy, the mostly mentionned risk

- Various kinds of risk structure
 - Individual integrity (connected cars, health app.)
 - Resilience of technical systems and companies (payment systems, public transportation)
- To set minimum standards of security and resilience (Ofcom)
 - In France, in charge by Ansii and Defence Code

Off: security





CONCLUSION

Public policies and governance at stake

~ Industrial regulation and innovation

- Industrial policy and incentives for R&D + implementation
- Competition policy

~ Technical governance of network infrastructure

~ IoT, services and applications

- The net neutrality
- Platform and data

~ Regulatory frameworks

- International conflicting perspective
- Globalized industrial services
- Consumers and citizens
- Standardization of data



- To develop prospective and enhance our vision of IoT
- Self regulation rather than premature IoT specific regulation
 - (Cf. FCC)
 - Self adjustment and pace of change to anticipate innovations
 - Risk of no investment for lack of standards
 - Subsidiarity, centralization of the governance of a distributed structure
- To support incumbent as well as innovative new entrants
 - To put up with telecom infrastructures and support to the development of IoT
- To make decisions in tune with European Telecom Single market
 - Platform regulation
 - Net neutrality
 - Privacy and data
 - European harmonization of spectrum management and allocation

Our guidelines and roadmap : open approach and facilitating role for a highly scalable technological field



Any questions ?
