IoT and Consumers: the missing spark
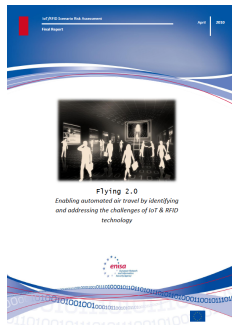
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April 9, 2016

Official Journal of the European Union

COMMISSION DECISION

of 10 August 2010

setting up the Expert Group on the Internet of Things

(2010/C 217/08)

Internet of Things in 2020

A ROADMAP FOR THE FUTURE

IOT ITALY

Flying 2.0

Enabling automated air travel by identifying and addressing the challenges of IoT & RFID technology

Communication

Ad-Hoc on Steroids

- IoT will be a "MANET on Steroids"
- Communication, in terms of physical wave transmission and protocols, will be the cornerstone of the IoT.
- Communication capabilities will have to include multi-standard a well as multi-protocol compatibility.

AIOTI WG3 IoT standardization landscape

IoT SDOs and Alliances Landscape
(Technology and Marketing Dimensions)

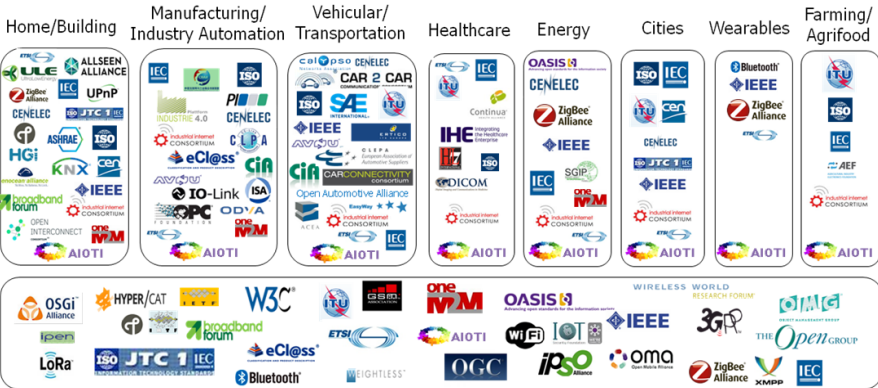Source: AIOTI WG3 (IoT Standardisation) – Release 2.0

Many related vertical and horizontal activities

IoT SDOs and Alliances Landscape
(Vertical and Horizontal Domains)

Source: AIOTI WG3 (IoT Standardisation) – Release 2.0
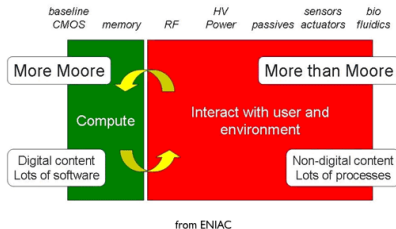
AIOTI
ALLIANCE FOR INTERNET OF THINGS INNOVATION

DIfferent Names

- IoT needs a "common way to call objects"
- Today, many different IDs not interoperable
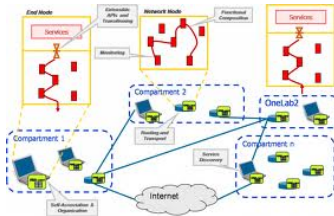- . . . don't ask STD bodies!!!!

Moore and More

- more Moore: CMOS Technologies (22 nm)
- more-than-Moore: systems on chip, lab on chip

from ENIAC

Self-Organising Networks

Autonomicity of Objects

- Architecture Independent (whatever the architecture, we will need this property)
- autonomic -> non deterministic

Zero Entropy

Energy is important

- Energy harvesting (any energy source)
- Energy conservation (new batteries)
- Energy consumption (ultra low power design)
    - high efficiency front-ends,
    - processors / microcontrollers cores,
    - signal processing capabilities,
    - sensors and low power base stations

Harsh Environments

BIOHAZARD

Out there is tough!

- Objects have to withstand extreme temperature
- Vibrations
- Humidity
- ...
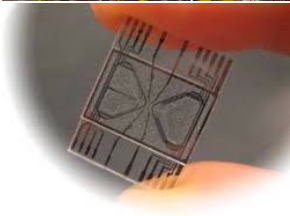
On a parachute stint ...

- In many cases. IoT devices will play a critical role
- The errors must be brought down to zero
- Resilience of systems has to improve
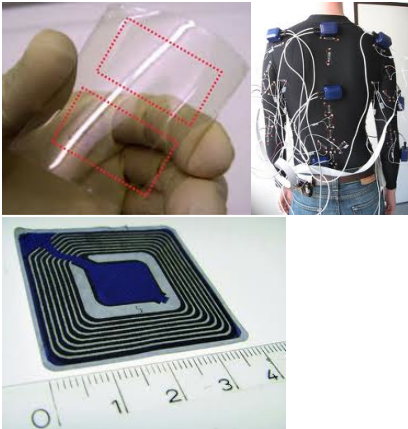
No more need for sylicon substrate

- Plastic Electronic RFID Chip (Philips) at 13.56 MHz
- Mount on metal at 2.45 GHz
- Final target: de-materialisation of chips

This is a Smart Toilet

```
Trustwave SpiderLabs Security Advisory TWSL2013-020:
Hard-Coded Bluetooth PIN Vulnerability in LIXIL Satis Toilet

Published:  08/08/13
Version:  1.1

Vendor:  LIXIL Corporation
Product:  Satis
Version affected:  Unknown Product description:

The Satis is a "smart" toilet.  It is controlled using LIXIL's "My Satis" Android application,
which communicates with the toilet using Bluetooth.

Finding 1:  Hard-Coded Bluetooth PIN
*****Credit:  Daniel Crowley of Trustwave SpiderLabs
CVE: CVE-2013-4866
CWE: CWE-259

The "My Satis" Android application has a hard-coded Bluetooth PIN of "0000" as can be seen in
the following line of decompiled code from the application:
```

```
BluetoothDevice localBluetoothDevice =
BluetoothManager.getInstance().execPairing(paramString, "0000")
```

- Any person using the "My Satis" application can control any Satis toilet, provided that the toilet is in pairing mode.
- If the toilet is not in pairing mode, it is still possible to pair with the toilet by observing Bluetooth traffic to learn the toilet's hardware address and pair with the toilet.
- An attacker can cause the toilet to repeatedly flush, raising the water usage and therefore utility cost to its owner.

Gutenberg's story

- Historically, revolutionary technologies needed some innovative business case to become successful.
- Gutenberg: his invention his considered the most important event of the modern era.
- In 1455 he published the bible
- Soon later he was bankrupt (he could not pay his debt)

IoT has a star future

Disruptive technology that will transform, life, business, and the global economy

- **Cisco** forecasts a value of USD 19 trillion by 2020
- **McKinsey** "The Internet of Things" has the potential to create an economic impact between USD 2.7 and 6.2 trillion annually by 2025
- **GE** sees IoT as 10 to 15 trillion world GDP by 2030
- **Gartner** sees IoT as one of the main 10 technology trends
- **CCID Consulting** calculated in 2011 the total output value of IoT in Chinese Industry more than 260 billion RMB

Market potential of Online Food Retailing, BACK IN Y2K

1. **Andersen Consulting** predicted a market share of Online Food Retailing of XXX % in the year 2003.

2. **Cap Gemini** predicted a percentage between YYY and ZZZ % (for 2003)

3. **Verdict Research** tuned the market potential of online retailing to AAA % in 2004 for the total retail sector and only BBB % for the grocery sector.

Market potential of Online Food Retailing, BACK IN Y2K

1. **Andersen Consulting** predicts a market share of Online Food Retailing of 20% in the year 2003.

2. **Cap Gemini** predicts a percentage between 30 and 40% (for 2003)

3. **Verdict Research** tuned the market potential of online retailing down to 3% in 2004 for the total retail sector and only 2.33% for the grocery sector.

SAN FRANCISCO BAY AREA
PACKET RADIO NET

ARPANET

BOLT BERANEK AND NEWMAN
CAMBRIDGE, MASSACHUSETTS

NORWEGIAN DEFENSE
RESEARCH ESTABLISHMENT
KJELLER, NORWAY

R

S
G
SRI

I

PACKET
RADIO NET

ETAM, WEST VIRGINIA
EARTH STATION

NORSAR
TIP

R

I

G

S

INTELSAT
IV-A

T

SRI
MENLO PARK,
CALIFORNIA

SRI
VAN

S

G

LEGEND

GOONHILLY DOWNS,
ENGLAND
EARTH STATION

S

TANUM, SWEDEN
EARTH STATION

R   PACKET RADIO REPEATER

I   ARPANET IMP

T   ARPANET TIP

S   SATELLITE IMP

G   INTERNETWORK GATEWAY

S/G PACKET RADIO STATION
     INTERNETWORK GATEWAY

········ PATH OF PACKETS

I

ISI-C

ATLANTIC PACKET
SATELLITE NET

G

UNIVERSITY COLLEGE LONDON
LONDON, ENGLAND

T

LONDON TIP

UNIVERSITY OF SOUTHERN CALIFORNIA
INFORMATION SCIENCES INSTITUTE
MARINA DEL REY, CALIFORNIA
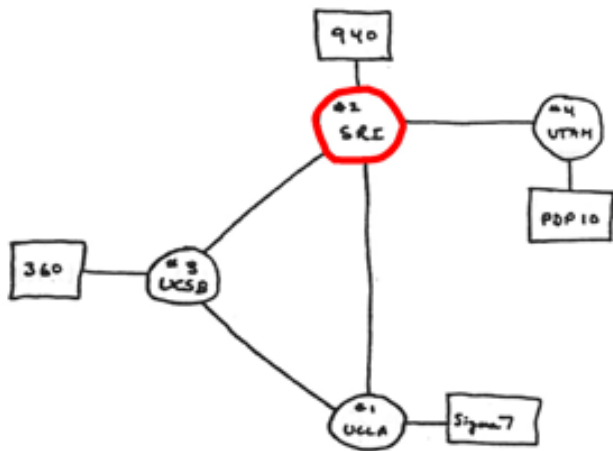
THE ARPA NETWORK

DEC 1969

4 NODES

Porter's synthesis

- Nice article from Porter and Heppelmann on Harvard Business Review
- Third wave of IT-driven competition
  1. Automated individual activities in the value chain.
  2. Rise of the Internet.
  3. IT becoming part of the product itself.

Business Models enabled by IoT

Product as a Service

- Company is NOT selling a product but a service.
- Pay-per-use scheme.
- No need of owning an object but rather focus on the service.
- Bottom line is on increasing the use per device, not the number of devices sold.

Product Sharing

- A group of people own together a certain object, and they all pay a share.
- Can also use a pay-per-use share, although the focus here is still on the ownership of a good.
- Maximising use of seldom-used goods.
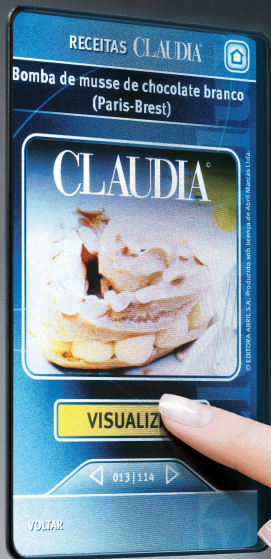
IoT enabled biz model: Car co-ownership

- The average for an apartment building is to have 2 car-spaces per flat.
- 90% of the cars are in the building
- Co-owning the car pool brings several advantages (shared TCO, larger car pool, . . .)
- IoT technologies allow easy traceability + billing.

SEZIONE TRASVERSALE

0m 1m 5m

- The product is at the center
- It must be optimised for the maximum possible usage
  1. Generic
  2. Robust
  3. Impersonal

Do you remember what happened with the internet?

- Typically, before the Internet, only few books were printed: the ones that were likely to become best-sellers.

- The Internet allowed a much larger number of titles to be printed "on demand".

- The above IoT-enabled business models call for products that are very "standard" as the focus is on maximum use - like the books in a (standard) library.

- However, next-generation factories can produce a number of customised products in a very easy way, to satisfy a larger number of customers.

Not really something new ... or to be excited about ...

Fuck Yeah Internet Fridge

Why doesn't my fridge
have the internet yet?
Curated by @rooreynolds

Archive

Submit your Internet Fridge

Search

[Search]

August 24th, 2015 at 8:48PM

Whilst the [Samsung RF28HMELBSR] fridge implements SSL, it fails to validate SSL certificates, thereby enabling man-in-the-middle attacks against most connections. This includes those made to Google's servers to download Gmail calendar information for the on-screen display.

— https://www.pentestpartners.com/blog/hacking-defcon-23s-iot-village-samsung-fridge/

2 notes

Let's think it out of the box!

- A supermarket may want to give fridges for free to its customers.
- A "smart fridge" can control the products inside.
- It can automatically send a "fill up" order on certain products.
- The Supermarket chain can optimise logistics, get data on consumption of good and use them for marketing purposes, "absolute" loyalty of customers ...

Connected Fridge

Even more out ...

- I set a rule "I always want at least 6 eggs in the fridge, I want free range or bio, and I want to spend max 30 cents per egg".
- My fridge is talking with all the fridges in the building (or even neighbourhood).
- They ask the different supermarkets (and why not, the hen houses) and negotiate on price.
- If all rules are met I get delivered my eggs when I get home (the house knows ...)
- if some rules are not met, I get an alarm "I've found the eggs but they cost 35 cents each. Shall I go for it? <confirm> <decline>"

What people are saying

why would I need that????

What people are saying

why would I need that????
Humble reply: Why did you buy a washing machine and a dishwasher?

- Apartments are beautifully designed, but . . .
- non-standard floorplans call for purposely-designed furniture
- which can be very time-consuming and utterly expensive as need to be made by an artisan.
- . . . or, thanks to novel technologies, done automagically on demand :)

IoT and Consumers: what is there and what is missing

- Technology is "almost" there. (bar minus problems)
- The main issue is how to match business models and technology!