Advanced WSN solution

Consideration about how an open middleware platform may enable the WSN/IOT world

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smart things, better life

Agenda

- Some history
- WSN Today
- The GAP
- What today
- Customer point of view & Quality
- Quality Table of a Middleware/WSN Solution
- Appsento platform: Big Picture
- Prodotti -> Appsento platform
- Appsento Node features
- What drive customers
- Summarizing
- Key words
- A message to you

Source Wikipedia

Some history

Saying who firstly was depicting the basic concept of WSN & IOT networks is not an easy task.

I wish to point your attention to Mark Weiser (1952 – 1999). He was a chief scientist at Xerox PARC in USA.

He is considered the father of ubiquitous computing from him invented in 1988.

This concept is most probably one of the closest to actual WSN and IOT.

Ubiquitous computing share a vision of small, inexpensive, robust networked processing devices, distributed at all scales throughout everyday life.

Wireless Sensor Network (WSN) consists of spatially distributed autonomous sensors to monitor physical conditions to cooperatively pass their data through the network to a main location.

The Internet of Things refers to uniquely identifiable objects (things) and their virtual representations in an Internet-like structure.

“ Ubiquitous computing names the third wave in computing, just now beginning. First were mainframes, each shared by lots of people. Now we are in the personal computing era, person and machine staring uneasily at each other across the desktop. Next comes ubiquitous computing, or the age of calm technology, when technology recedes into the background of our lives”

WSN today

WSN App Is Challenge Today	Every time today you are facing the challenge of starting a WSN/IOT application you have to build back from scratch a huge value chain .
WSN Project Stop Because Budget	In a normal WSN project designers have to solve so many issues and problems that most of them not get out from university lab or even worst stop, in real world, before because budget consideration.
WSN & IOT Face Barrier	WSN and IOT, in general distributed computing, have to face a lot of technical, communication and interfacing challenges and the miss of an open middleware platform is a real barrier for the development of WSN based application and market.
OPEN Middleware Interface Existing Transducers	Open Middleware Platform is a concept that describe a cost effective solution being able to interface as much as possible industrial existing transducers.
OPEN Is Reasonable Cost & Adding Sensor As Like	“OPEN” itself means not that all the part of the value chain are accessible from the knowledge point of view but describe the fact that the platform is built to read, process and transport as much data is possible interfacing common existing hardware in a real world at a reasonable cost. Permitting also at certain conditions to add further sensors after an initial deployment.
OPEN Enable Easy App Building	“Open” is a vision to market to offer environment & solution that enable with less barrier as possible easy applications building and delivery.

Today there is a gap between demand and offer. This gap is not a consequence of technology limitations but from a poor integration between different technologies

The Gap

Today Wireless Sensors show “an evolutionary delay" compared to the internet of things

Offering

- HW solutions available at the chip or board (scarce attention is for the RF component "external" to the chip or board);
- Devices are complex to configure and manage very misleading indications of potential performance (range radio to AXM, throughput up to y kb / s, etc.).
- War of protocols at the level 2 / 3 without any guidance to the final result
- Products for a market-oriented research laboratories, with an almost prototypical
- Skills required to integrate and manage WSN applications in realistic environments are still very high. Performance / reliability achievable are modest

Vs

Demand

- Plug & Play Solutions
- Integration between acquisition capabilities, data transmission, device management, security, reliability, resilience.
- Internet readiness
- Low costs
- "Consumer Approach«
- " large volumes «
- Upgradeable
- Outdoor scenarios
- Value Added Services Availability

What today ?

Today important is to plug the real world with Internet through WSN !!

The bet is to transmit physical measure from existing hardware to processing device … or community in an understandable and "open" way.

The problems we are facing today **is not**:

- the existing hardware choice or
- to bring IP communication all over, even to remote nodes or
- making a battle on standard to make one being widely adopted or
- the effort to transfer IP protocol at the end of value chain to remote nodes.

The challenge is to build and offer at industrial prices an all including, easy to use solution to enable developing applications.

Customer point of view & Quality

Customers want :

•To reduce difficulties and roadblock in projecting and realizing wsn applications

•To deliver a system of standard services to different application

•To offer and provide rules for an efficient use of resources

•To translate physical measure in a digital data

•To normalize the data making them computer process “able”

•To geo & time tag the data from each node coming

•To permit extending the project on future needs coming

•Extend Robustness and Scalability

To target all this bullet points we must consider a very important issue .

THE QUALITY

Quality of a solution is critical !!!

How can we measure it ?

Which are the parameters that identify the quality of a solution ?

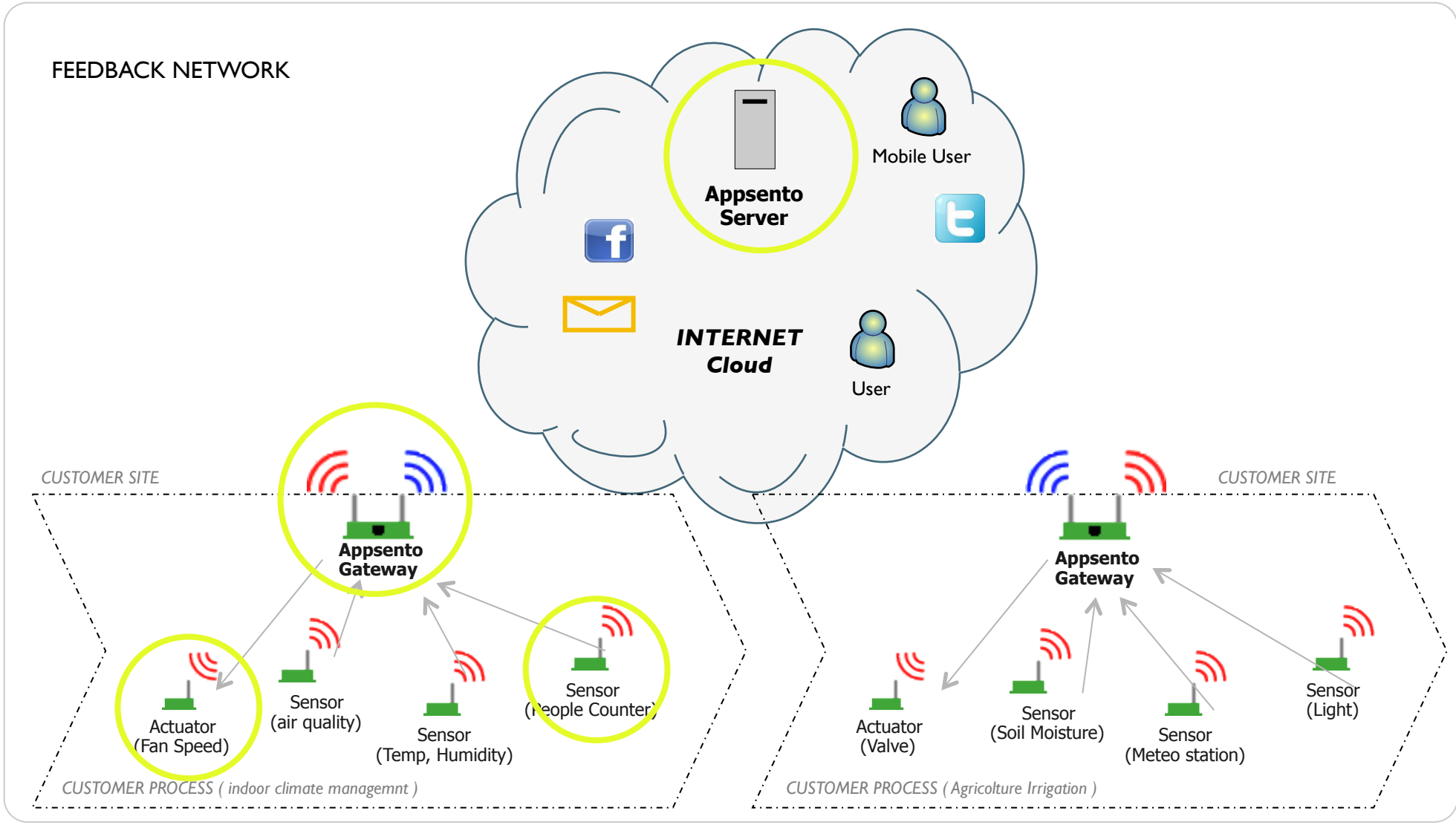
In Appsento we define a method based on featuring.

Quality Table of a Middleware/WSN Solution

Features					Evaluation
Smart	Local Intelligence	Predefined configuration	Easy to use	Easy to Install	☆☆☆
Save	Low energy consumption	Low Environmental impact			☆☆☆
Send	Different protocol				☆☆☆
Self	Auto consciousness	Environmental awarness	Auto diagnostic		☆☆☆
Secure	Security level management	Application security	Communicatio n security		☆☆☆
Safe	Physical security	Outdoor physical security	IPX level		☆☆☆
Store	Local data storage				☆☆☆
Sense	Environment sensing	Collect physical measure	Transform in computable data		☆☆☆

Appsento platform: Big Picture

Core elements of Appsento platform



Products -> Appsento platform

Appsento Platform

- "Nodes" (hw + sw) = sensors of physical quantities or actuators capable of: communicating via a wired or wireless network (Sub 1Ghz low power)

- "Gateway" (hw + sw) = communication devices able to:
  interconnect WSNs with the Internet technology (both public and private configuration) and to create virtual entities (avatar) that represent physical quantities acquired by the nodes in the virtual world of the internet

- "Monitoring Server and Historian" (sw) = Software web based able to:
  collect / transmit data from / to one or more gateways,
  create time series databases,
  visualizing trends over time and position in space (adding geo tag where possible)
  specify the simple rules that allow you to associate actions to event (eg alarms when thresholds are reached)
  Integrated via "plug-in" with various messaging systems and social networks

Appsento Node features

Functionality

- Ability to acquire data / signals / physical quantities and transmit them to one or more "coordinators" (typically Gateways) according policy related to:
  - low latency
  - overall throughput
  - energy savings
- Ability to receive commands to operate the actuators.
- Acts as a data-logger with delayed transmission
- Monitoring of the internal state of the device to support the processes of self-diagnosis, predictive maintenance, backup.
- Programmability SW transmission power

Features

- Power supply: USB, battery: battery status monitored via software.
- Software also portable across platforms.
- Communication protocols "installable" as a function of the standard to support WSN
- Real-Time Microkernel
- Support for redundant configurations
- Update software over-the-air (only available in certain configurations)

What drive customers

The whole "electronic" existing solution are weak when customer start realizing they can play with real world as they are used with data and communication in the internet era and advanced WSN solution do it.

- Data has value

All the enabling technology is just expected to exist they are focusing on solution

- Solution no techies

When they start thinking deploying a dedicated sub gig network for measuring physical data they swap in a "new" world where other things are possible, and they are asking for !

- Open to new interconnection wave

Customers because of their role in which every action has a cost and must be repaid in their annual balance has a more pragmaticall approach and this must drive commercial and business oriented solutions that want to succed.

Summarizing

WSN is just part of a solution to obtain more efficient process or to enhance quality of life

Node must contain proper logic and intelligence.

Gateway must be able to message brokering and support scaling.

H&M Server must act as repository and container of the normalized data.

A platform offering advanced functionality and modern message brokering is a real value, and customers are understanding it

Market & Customers wants solutions not technology

A good middleware offering is the way for WSN to enable estensive IOT world.

Key words

Ubiquitous computing	Budget consideration	Open to standard HW	NO War protocols
Plug and Play	Efficiency	Better Life	Translate physical data
Quality of solution	Node intelligence	Gateway scalability	Real value Low cost
H&M Server	Enabling IOT	Application = Solutions	Challenge

A message to you..

We are actually a startup with very limited resource but we are willing to start some collaboration with Africaan entity.

In case you will found a possible application that may enable efficiency process and better life in Africa, please let us know writing at ict4africa@appsento.com maybe we can start a collaboration or a little project.

Thank a lot for your listening.

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