Ubiquitous M2M Service Networks – ITEA2 Usenet project

Internet of things is here – Tekes Ubicom highlights Workshop
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M2M (machine to machine) ?

- M2M consists of ICT technologies enabling *remote measurements and remote control of devices*.

- M2M includes sending, receiving, storing and processing of measured information and all kinds of actions needed for remote controlling of devices.

- M2M highlights the services exposed from various embedded devices such as tags, sensors and actuators.

- M2M vs. Sensor networks

- M2M vs. Internet of Things
Consortium of ITEA 2 Usenet 06004

Cost & Effort
- 13.6 M€
- 144 person year

Project duration:
1 Sept 2007 - 31 Dec 2010
Motivation

Focus:
• M2M systems, especially infrastructure enabling M2M service networks

Problems
• M2M is highly fragmented vertical market, without any interoperation between domains
• High R&D cost because of separately developed solutions for each domain, and even specific business cases
• “Inventing the wheel again and again” in different contexts
Approach and Targeted Innovation

Approach to solve the problems:

- Enabling Horizontal M2M Infrastructure to boost transfer from vertical towards more horizontal business
- To lower the cost of R&D for M2M systems
- To create new business opportunities for M2M stakeholders
- M2M standardisation towards horizontal approach

Targeted innovation:

- **M2M Internet**: Ubiquitous use of the services provided by machines, devices, sensors and actuators which are connected to heterogeneous networks
Main contribution of the project

Specification of horizontal M2M Infrastructure

R&D of M2M vertical cases
Horizontal M2M infrastructure?
A view to Usenet M2M System Architecture

M2M Applications

M2M Service Platform

M2M network

Asset network

Sensor/actuator

Asset gateway

Asset node

An example of M2M Overlay Network

M2M Infrastructure

M2M Applications

M2M Service Platform

M2M network

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An example of M2M Overlay Network

M2M Infrastructure
M2M standards & industrial forums
Application Domain Specific Experiments 1/2

Home Automation - Domotics

Sport & Wellness
Application Domain Specific Experiments 2/2

Telematics

Transportation

Functional & maintenance monitoring
- Functional: traffic monitoring, driver and vehicle assignment...
- Maintenance: machines status, services lifecycle...

Remote Administration of services and devices

Embedded router

Passenger with consumer device

Technician

Central Display

Maintenance engineer

Telematics

Production Control

- Production Data Monitoring
- Availability Data Monitoring
- Supplies Chain Control
- Production Plans Management...

Machine Provider

- Process Related Data Control
- Special Features Control
- Availability Data Management
- Advanced Assistance Services

Advanced in-situ TAPS
- Component Diagnosis Tools
- Set-up Tools
- Optimisation Tools...

Machine Provider

ON BOARD SERVICES

- Embedded Sensors for Advanced Services Usage
- Control and Process Parameters Optimisation
- Process Monitoring...

On-board services

Industrial M2M - Machine tools
Integrated vertical cases
”A day in the life of a man in future M2M world”

- Home M2M
- Industry M2M
- Transportation/telematics M2M
- Wellness M2M

Workday:
- Industry M2M Automation to
  1) improve productivity
  2) quality of services

Afternoon:
- Transportation M2M Automation to
  1) improve vehicle maintenance services
  2) improve comfort/save time of travellers

Morning:
- Home M2M automation for
  1) comfort in the tedious daily routines
  2) to save energy in the house environment

Evening:
- M2M Automation for
  1) enable monitoring & analysis of performance
  2) enable professional guidance for the exercise

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Main achievements

- Conceptual Horizontal M2M Infrastructure Specification, and corresponding SW which have been evaluated in different experiments

- Vertical domain specific experiments and evaluating the horizontal M2M approach, e.g. real-time applications

- Exploitation of results in ca. 13 different products / pre-commercial products by industrial companies

- 55 publications, e.g. IEEE conferences and magazines, and Springer journals.

- High impact on the M2M standardization especially in the ETSI M2M TC via the project industrial partners

- Spin-off company, Geosparc (www.geosparc.com), Belgium, GIS application framework (Geomajas open source project) & services.
Smart M2M services for Building automation

- Centralized remote monitoring and control service system for building automation
- Enable remote use of Ouman automation devices over the Internet using Web browsers
- Smart real-time services which can help in building maintenance
- Useful in maintaining large number of buildings that includes a lot of automation devices and system users
- Can increase efficiency, save working time and reduce cost of building automation services
OUNET BRINGS TOGETHER BUILDINGS AND USERS
LIVE MONITORING ENABLES ACCURATE TUNING AND PROCESS OPTIMISATION
- REAL SAVINGS!

Graphic trend helps to visualize measurement history and interaction of numbers of variables
Research collaboration with UCB
Remote Management of FPGA based Hardware

- Reconfigurable Architecture for Multicore FPGA based hardware
- Technology for Remote measurement and maintenance system
- Features and even the number of processors can be remotely updated
- Able to work in harsh special environments (e.g. under water, high pressure>50bar, wide temperature range -40-+50*C)
Impact to M2M Standardization

- Usenet project has been *a pioneer project* in initiating horizontal M2M Infrastructure Specification works

1. Start of ITEA2 USENET (9/2007)
2. ETSI Starts investigation on horizontal M2M (6/2008)
3. Industrial partners provide necessary arguments for ETSI
4. Start of ETSI M2M TC (1/2009)
5. ETSI M2M Workshop (10/2010)

- 220 participants “biggest workshop which ETSI has ever had”
- 3GPP, OMA, MSTF, …
Concluding Remarks

- New project has already started (April 2011): Autonomic services in M2M networks (ITEA 2 project A2Nets, [https://a2nets.erve.vtt.fi/](https://a2nets.erve.vtt.fi/))

- The results are currently being exploited also in research projects dealing with regulatory M2M cases related to smart grids and electric mobility (e.g., Artemis Internet of Energy - IoE project)

- Join into the M2M interest group, information available at [http://usenet.erve.vtt.fi](http://usenet.erve.vtt.fi)
  [http://a2nets.erve.vtt.fi](http://a2nets.erve.vtt.fi)
Thank you for your attention

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