Eclipse, M2M and the Internet of Things

Overview

**M2M?**

“Technology that supports wired or wireless communication between machines.”  
(TechTarget)
M2M Market Opportunity

Key Trends

1. New connected devices, applications and services
2. Lower system costs
3. Simplified development
4. Network operator focus and investment

Estimated Number of Active Cellular M2M Connected Devices 2010 to 2020

Source: Machina Research, July 2011
However...

- **The market is fragmented**
  
  Hardware, software, protocols... all different, independent
  
  Lack of integration... between devices, to enterprise systems

- **M2M development is complex**
  
  Many different skills required...
  
  Hardware, Embedded, IT network, Telecom, web
  
  No common architectural guidelines

- **Current options are closed**
  
  Monolithic solutions...
  
  device specific, app specific, market specific
  
  Proprietary SDKs, protocols, potential vendor lock-in
The M2M Market

B2B Market Segmentation / Devices

- Single Purpose / Single Service M2M Devices
  - Lowest cost per node
  - Single purpose devices
  - Performance optimized coding
  - Embedded approach necessary

- Multi Purpose / Multi Service M2M Devices
  - Lowest cost per service
  - Multi service systems / gateways
  - Abstracted coding (Java, OSGi, Lua)
  - IT centric approach feasible
# The Internet of Things

## Technology Implementation Challenges

<table>
<thead>
<tr>
<th>Goal</th>
<th>Result</th>
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<tbody>
<tr>
<td>➢ Decoupling Producer/Consumer implementations</td>
<td>➢ Many to many, not one to one</td>
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<tr>
<td>➢ Adoption of open, IoT focused message transports</td>
<td>➢ Efficient, bidirectional, QoS, payload agnostic</td>
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<td>➢ IT and developer centric application frameworks &amp; tooling</td>
<td>➢ Tools for the development community</td>
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<td>➢ Cost effective, agile, and low power hardware platforms</td>
<td>➢ Flexibility in device options</td>
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<td>➢ Public/private cloud deployment infrastructures</td>
<td>➢ Zero config deployment</td>
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<tr>
<td>➢ Scaling beyond single solutions</td>
<td>➢ Interconnecting platforms</td>
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IoT – Integrated Solutions
Public/Private Cloud Deployment Infrastructures

- Transportation & Logistics
- Logistics
- Security & Surveillance
- Medical & Healthcare
- Communication Infrastructure
- Industrial & Energy
- Internet of Things
- Public/Private Cloud Deployment Infrastructures
IoT - Scaling M2M Solutions
Connecting Platforms – Why Standardization Matters

Diagram showing the connectivity between SaaS, PaaS, Platform, Application, and Devices.
USE CASES
Vertical Market Application Scenarios
Medical Services Gateway

- Smart Pill Boxes
- Heartbeat Sensor
- Weight Scales
- Blood Pressure
- Blood Sugar

Near field

Medical Services Gateway

Internet of Things

Communication Infrastructure

M2M Industry WorkGroup
Vertical Market Application Scenarios
Logistics Services Gateway

- Smart Container
- RFID Readers
- Handheld & Wearable Devices

Logistics Services Gateway
Communication Infrastructure

Internet of Things
Eclipse M2M IWG Solution
M2M Industry Working Group pillars

- Promote **open interoperability** between the M2M gateways and M2M server, and between M2M servers and servers supporting Web and Enterprise middleware and application models.

- Provide **tooling** for M2M gateways development including integration with M2M servers.

- Provide samples, examples, testing environments and technical documentation via a **developer hub**.
Open Ecosystem for M2M

Third Party Ecosystem

- Open M2M communication protocols
- Open M2M application framework and runtimes
- Open M2M development tools

Internet of Things
Open M2M Communication Protocols

Third Party Ecosystem

Open M2M communication protocols

MQTT
OMA-DM

C
Java
Lua

Internet of Things
Open M2M Framework

Third Party Ecosystem

properties, events, services

Device Management

Open M2M application framework and runtimes

Communication

transport, encoding, policies

Internet of Things

Open M2M application framework and runtimes

Communication

transport, encoding, policies

Third Party Ecosystem

properties, events, services

Device Management
Open M2M Tools

Third Party Ecosystem

- Open M2M development tools
- Communication Simulators
  - device simulators, bandwidth estimators
  - code generators, samples, templates
- Embedded dev.
- Server tools
- server simulators

Internet of Things
M2M Developer Portal

m2m.eclipse.org

collaborative development hub for m2m developers

- Development Tools
- Examples, Tutorials
- Technical documentation, Forum
- Developer kits
- Sandbox

open m2m runtimes

libraries & frameworks for m2m development

- Embedded frameworks
  Device Management, ALM, ...
- Communication libraries
  m2m and industrial protocols
- Server
  data brokers, API, ...

open m2m tools

consistent & extensible development tools

- Embedded development
  target management, emulation, ...
- Communication protocols
  simulation, bandwidth estimation, ...
- Server
  API discovery, deployment, ...

M2M Industry WorkGroup
Eclipse projects mentoring

- **Koneki** | [http://www.eclipse.org/koneki](http://www.eclipse.org/koneki)
  - Provide tools to ease M2M applications development
  - Initial contribution includes an IDE for the Lua language
  - Next milestones: OMA-DM tools, code generators, simulators, …

- **Paho** | [http://www.eclipse.org/paho](http://www.eclipse.org/paho)
  - Provide implementations (client & server) of open & standard messaging protocols
  - Initial contribution includes Java and C client-side implementations of the MQTT protocol, and sample applications
Who?

- BandX International
- Eurotech
- IBM
- Sierra Wireless
More information

- M2M Portal  [http://m2m.eclipse.org](http://m2m.eclipse.org)
- Mailing list  [https://dev.eclipse.org/mailman/listinfo/m2m-iwg](https://dev.eclipse.org/mailman/listinfo/m2m-iwg)
Thank You!

www.eclipse.org