Enabling Smart Data on M2M Gateways and Aggregators

How OSGi and Java enables smart data on M2M aggregators and gateways.

3/27/2013

Hitachi Communication Technologies America, Inc.

Walt Bowers
Chief Architect OSGi Solutions
Enabling Smart Data on M2M Gateways and Aggregators
How OSGi and Java enables smart data on M2M aggregators and gateways.

Contents
1. M2M Overview
2. Aggregators and Gateways
3. Developer Challenges in M2M
4. OSGi – The M2M Framework to enable smart Data
5. Demo
Enabling Smart Data on M2M Gateways and Aggregators
How OSGi and Java enables smart data on M2M aggregators and gateways.

1. M2M Overview
M2M Overview

Cloud for Embedded Devices

- Personal Devices
- Med-Large Embedded / Multi-function Devices
- VoIP Communications
- Industrial controls / Network Appliances
- Sensors / Microcontrollers
- Meters
- Smart Appliances & electronics
- Connected Vehicles
- Enterprise Data & Applications

Management / Monitoring / Operations

© Hitachi Communication Technologies America, Inc. 2013. All rights reserved.
M2M Architecture

Cloud / Network Infrastructure

Services
Communications, Data Aggregation, Software Updates, Local Analytics etc.

Applications
Industries: Healthcare, Energy, Automation, Communications, etc.

Platform & Services

Language
Java Language & Tools

Devices

Clients
Java Card

Embedded Platforms & Extensions

Java Embedded

Servers

© Hitachi Communication Technologies America, Inc. 2013. All rights reserved.
Development on the Client Side

To Cloud/Application

<table>
<thead>
<tr>
<th>Client</th>
<th>Services</th>
<th>Communications, Data Aggregation, Software Updates, Local Analytics etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Language</td>
<td>Java Language &amp; Tools</td>
</tr>
<tr>
<td></td>
<td>Embedded Platforms &amp; Extensions</td>
<td>Java Card</td>
</tr>
<tr>
<td></td>
<td>Devices</td>
<td>Java Embedded</td>
</tr>
<tr>
<td></td>
<td>Sensors</td>
<td>Z-Wave</td>
</tr>
</tbody>
</table>
• Size, Growth, and Technology is driving an expected Revolution
  – 50+ Billion connected devices anticipated 2020*
  – Processing power continues to increase within these devices allowing for enhanced intelligence
  – Increasing number of ways to effectively interconnect Machines/Devices/Equipment to an end users, cloud, and business applications

* Source Ericsson

• However, realization of these benefits are not occurring today because:
  – Complete or end-to-end solutions are inherently complex and costly to design, develop and deploy
  – Solutions that are deployed today can be a combination of technologies that are stitched together and thereby not able to evolve or adapt easily
Enabling Smart Data on M2M Gateways and Aggregators
How OSGi and Java enables smart data on M2M aggregators and gateways.

2. Aggregators and Gateways
Many Devices at a location

- How to act on local data?
- How to do local analytics?
- How to create smart data for the cloud?
Aggregators – One Device to Rule them All

- **WiFi**
- **Bluetooth**
- **IP**
- **Zigbee**
- **Z-Wave**
- **CANBUS**
- **DECT**
Aggregators and Gateways

• Control and Collect Data from sensors and devices
  – Aggregate data from multiple sensors/devices
  – Provide local management for sensors/devices
  – Intelligently determine when and how to upload the data

• Local Analytics
  – Smart network usage
    • Alert – send via 3G/4G network immediately
    • Data collection, wait till WiFi or off peak
  – Local analytics
    • Turn sensor or switch on/off based on local rules
    • Local decisions based on local sensor data
  – Behavior can be *dynamically* updated
    • Controlled by cloud based on global analytics
Aggregators in the Network

Network (Wired or Wireless)

App Servers

Consumer

Hospital or Healthcare Provider

Company Field Support Staff

3rd Party Service Provider

Business Operation Mgr
Enabling Smart Data on M2M Gateways and Aggregators
How OSGi and Java enables smart data on M2M aggregators and gateways.

2. Developer Challenges in M2M
Which Aggregator Platform
Java - Device Independence

Just Add:

But we are still missing:

• Application Lifecycle
  - Install, uninstall, start, stop, upgrade
• Multiple Versions of Application
• Dynamically Changing the Behavior
• Discovering Services
## M2M Networking Technology

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-232</td>
<td>RS-485</td>
<td>RS-422</td>
<td>RS-232</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethernet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GSM/GPRS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satellite</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 802.11 a&n
- WiMax
- 6LoWPAN

### Bluetooth
- Zigbee
- ZWAVE
- LTE

### 802.11 b&g
- USB
- Wireless Hart
- HSPDA
- Satellite
- GSM/GPRS
- Ethernet
- X10
- RS-485
- RS-422
- RS-232
Java + OSGi

M2M Smart Aggregators and Gateways
Enabling Smart Data on M2M Gateways and Aggregators
How OSGi and Java enables smart data on M2M aggregators and gateways.

4. OSGi – The M2M Framework for Smart Data
Java and OSGi in M2M Architecture

- Provides common bundles to promote applications
- Development of Common bundles/services to abstract protocols
- Added value for application developers
OSGi benefits for M2M

• Quicker development and deployment of M2M solutions
  – Device and sensor abstraction
  – Focus on the business solution not the underlying sensor technology
  – Access to large community of Java developers
  – Quick integration and use of existing projects

• Gateway behavior can be changed dynamically and remotely
  – Local analytics and business rules are controlled by global analytics
  – Dynamically adapted for verticals or specific customers

• Broadens the scope of M2M applications
  – Applications can be re-used in different verticals

• Combining of existing services to create new services
  – Applications use services of other applications to create new services

• Portability of M2M Applications
  – Java allows device independence
  – Same application on many gateway types
Enabling Smart Data on M2M Gateways and Aggregators
How OSGi and Java enables smart data on M2M aggregators and gateways.

5. Demo
JavaOne NFC Demo

MiraBox

- ZWave
- Zigbee
- Multi-Sensor
- LCD Display
- Energy Switch
- NFC Reader

© Hitachi Communication Technologies America, Inc. 2013. All rights reserved.
Enabling Smart Data on M2M Gateways and Aggregators
How OSGi and Java enables smart data on M2M aggregators and gateways.

3/27/2013
Hitachi Communication Technologies America, Inc.
Walt Bowers
Chief Architect OSGi Solutions
Walt.bowers@hitachi-cta.com
OSGi DevCon Session Feedback

1. Sign In: www.eclipsecon.org

2. Select Session Evaluate

3. Vote

Making ALM Work - Transform your Application Lifecycle Management to Foster Innovation (presented by HP)
Ronit [HP]
Human Dreams. Make IT Real.
Appendix
Transportation Apps – buses, trains, fleet

1. Location tracking (LBS)

2. Route monitoring (Time of day optimization)

3. Passenger Counter

4. Fraud detection (Passenger counter, camera, fare collection)

5. Camera (Normal operation, local storage; emergencies such as Amber alert, streaming to emergency authorities)

6. Vehicle diagnostics (Sensors throughout vehicle)

7. Digital signage (Information and advertising - Location aware)
SuperJ® Applications Ecosystem: Security, Home Control, Connected Health, Media Sharing

- Energy Wall-Plug Management Device
- Wireless Indoor Light Module
- Z-Wave
- SG200 Service Gateway
- Wireless Appliance Switch
- Z-Wave
- WiFi
- Ethernet
- Media Sharing
- HDMI
- Typical CenturyLink BB Router e/w Wifi
- WiFi, Z-Wave, ZigBee, Bluetooth
- Connected Health
- Scale Activity Monitor, Blood Pressure Thermometer
- Wireless Door Window Sensor
- Wireless Outdoor Light Module

© Hitachi Communication Technologies America, Inc. 2013. All rights reserved.