Monetising Big Data in Smart Cities

Leaders in the New Last Mile.

Brussels 6 September 2013
Gareth Price
NEC Europe Ltd.

Empowered by Innovation.
NEC Group at a glance

Key Facts

- Established July 17th, 1899

- Financials year ending 31 March 2013
  - Revenue US$ 37B / € 29B
  - Carrier Networks US$ 7.9B / € 6.1B
  - Europe US$ 1B / € 800M

- Employees 109,000 worldwide

Net Sales

- IT Solutions 41%
- Carrier Network 19%
- Social Infrastructure 7%
- Personal Solutions 21%
- Others 12%
Do you remember?

March 11 2011?

M9.0  6m  2.4m  40.5m  10m  1.8μs  24684
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:46:23</td>
<td>Earthquake 130km off Sendai coast</td>
</tr>
<tr>
<td>14:46:46</td>
<td>P-Waves detected</td>
</tr>
<tr>
<td>14:46:54</td>
<td>Emergency alert broadcast</td>
</tr>
<tr>
<td>14:47:17</td>
<td>S-Waves hit Sendai</td>
</tr>
<tr>
<td>14:48:15</td>
<td>S-Waves hit Tokyo</td>
</tr>
<tr>
<td>14:54:xx</td>
<td>Regional Tsunami warning issued</td>
</tr>
<tr>
<td>15:09:xx</td>
<td>Tsunami hits nearest coast</td>
</tr>
</tbody>
</table>
Ocean Bottom Observation Systems

- 9 NEC supplied OBOS to date
- New 3yr plan starting 2012
- Over 5,000km of Submarine cable
- 150 Undersea seismometers

System Owners:
- JMA: Japan Metrological Agency
- ERI: Earthquake Research Institute
- NIED: National Research Institute for Earth Science and Disaster Prevention
- JAMSTEC: Japan Agency for Marine-Earth Science and Technology

Note:
- In-Line (Digital)
- In-Line (Analog)
- NODE (Digital)

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M2M gives vital time, triggers emergency protocols

14:46:23 Earthquake 130km off Sendai coast
14:46:46 P-Waves detected
14:46:54 Emergency alert broadcast

- Trains Stop
- Elevators Stop
- Cranes lower materials
- Surgical Operations Stop
- Phone receive alarms
- Clocks receive alarms
- TVs issues warnings
- Gas is disconnected
- Factory lines stop
- Cars pull over
- X-ray room doors open
- Reactors start shutdown

14:47:17 S-Waves hit Sendai
14:48:15 S-Waves hit Tokyo
M2M helping to restore Northeast Japan

Soil Desalination effort

NEC sponsoring a new technique reducing recovery time from 2yrs to 4 months

Soil moisture, temperature and salinity measured and sent to CONNEXIVE for storage, sharing and analysis

Radiation Monitoring effort

Horizontal data re-distribution

Sharing

Parks
Offices
Farmland
Danger zones
Evacuation zones
Monitoring and controlling precious Energy

Japan has an energy crisis
Our system gives feedback to staff
Collects data for big data analysis

NEC Japan’s staff portal

Sensors for Temp, Humidity & Current

Environmental measurement

Optimal Control

Substation facilities

Lighting equipment

Air conditioner

Sanitary facilities

Anti-disaster facilities

Visualization server

(Measurement of environment & energy)
(provision of visualized information)

Electricity

Water

Gas

Control System
Smarter Cities

NEC considers Smart City can be modeled as a layered structure:

- **Sensors, Social Media and Apps** help acquire new input into city decision processes
- **Feedback** is critical in service automation and the influencing of citizen behavior
The Secondary Data Market and Big Data

Today: Primary Market Data (Siloed)

Revenue Share

Secondary Market Data

Additional sources

Big Data

- Breakdown service
- Mobile Carrier
- Field Service Manager
- Law enforcement
- Hire company
- Taxi company
- Future Owner
- Analysts
- Road Authority

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Slices of Smart City intelligence
1. Separate service and data from M2M technology
2. Share data with your eco-system or value-chain
3. Transfer partner integration cost to partners in the cloud
4. Monetise data through publishing & re-distribution
5. Systematic and speculative Big data analytics of data
6. Incorporate external data you don’t have in Big Data analysis
3 Steps to a Secondary Market

1. Just my company
   - Only I receive M2M data
   - I integrate with my partners
   - I forward to my partners
   - All data goes to me

   Hmm, perhaps I should not be the integration point?

2. Me and my Partners
   - Selected partners and I receive data
   - They integrate to the cloud
   - I choose what data goes to which partner and when
   - I probably sponsor this

   Hmm, perhaps other people will pay for this data?

3. Anyone
   - Anyone can buy data slices or subscribe to data feeds
   - Data may be delayed for quality or competitive reasons
   - I decide what can be shared and when

   Wow, this subsidises my primary business purpose!
M2M Big Data Challenges

Collection & Access

Unstructured Data

Volume & Scalability

Analysis

Transaction Data

Context Data

Control Data

Re-distribution: Privacy, Policy & Ownership

<table>
<thead>
<tr>
<th>Service</th>
<th>Number of Device</th>
<th>Update Freq.</th>
<th>Number of Event (and Detail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Phone Location Base</td>
<td>50M Mobile Phone</td>
<td>1 event/min</td>
<td>830,000 event/sec</td>
</tr>
<tr>
<td>Probe Car</td>
<td>80M cars</td>
<td>1 event/min</td>
<td>1,330,000 event/sec</td>
</tr>
<tr>
<td>Home Electric Appliances</td>
<td>400K Home server</td>
<td>20 event/min</td>
<td>130,000 event/sec</td>
</tr>
</tbody>
</table>
The M2M data ecosystem

- Applications
- Data Mining
- Hadoop
- Image Processing
- Invariant Analysis

- Device Integration & Mgmt
- Application Mgmt & API

- Cloud M2M
- Cloud Data Analytics
- Cloud Data Storage & Publishing

- SIM / Account platforms
- Network Aggregators

- EDW
- Cloud Data-warehouse

- Face & Age Recognition
- Cloud Integration Hubs
Data Processing Components for Big Data

- Generic Analytics technology in NEC

**Analysis/ Media Analysis Layer**
- Invariant Analysis (SIAT)
- Voice (CSView)
- Image (NEOFace)
- Geofencing
- Statistical Analysis
- Rules Engine
- Data Mining
- Classification
- Machine Learning
- Distributed Processing Language

**Collection/ Integration Layer**
- Memory DB
- Cache DB
- Dispersive KVS (Hadoop)
- Column DB

**IT Platform Layer**
- Middleware Infrastructure
- Servers
- Storage
- Network
Monetisation in the City

Smart City are cities which are able to listen and comprehend

NEC considers Smart City can be modeled as a layered structure:

- Social
- Transport
- ICT
- Utility

Smart City Service Portal
- Self-Service
- Monetisation
- Service Delivery

Smart City Control Centre
- Citizen Processes
- Enterprise Processes
- Government Processes

Citizen Information
- Enterprise Information
- Government Information

Open Government
- Monetisation
- Service Planning

Control
Collect
Store
Analyse
Share/Publish
Today: Real World + M2M + Big Data + Cloud

- Invariant Analysis
- Geofencing
- Shin-Tomei Expressway Traffic Control System
- ToppenForms MechaCool
- Cold Chain in the Cloud

- Audience Aware Advertising
- Audience Analytics
- In-car driver face recognition

120+ Farms in New Zealand using CONNEXIVE to manage lawful fertilizer use – paying monthly.

$20m Invariant Analysis deal with Shimane Nuclear power plant in 2013.
Contact Us

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NEC’s Engagement Vision

Customer Driven Evolution
One stop shop for the New Last Mile
• Consulting
• Services
• Partnership

Digital Services
• Transactional
• Analytical
• On-demand
Delivered from our cloud

Real World Networks
• Fit for data growth
• Shaped by local needs
• Real world sensing
Enabled by Mobile Backhaul M2M and Small Cells

Service Driven Networks
• Responds to external stimuli
• Shaped by business and service context
Enabled by SDN and NFV

“The network is becoming less an architected ‘structure’ and more a programmable ‘fabric’, continually shaped by dynamic service needs and highly varied user contexts”