TOMORROW starts here.
Internet of Things: M2M for Service Providers

BRKSPM-2010

Fernando Cerioni
Product Manager
Internet of Everything

Intelligent Connections

People

Process

Data

Intelligent Network

Things

Internet of Everything
IoT Drivers

PROCESS MANUFACTURING:
Remote operations, workforce optimization, analytics

TRANSPORTATION + LOGISTICS:
Preventive maintenance, fleet tracking, new customer experiences

DISCRETE MANUFACTURING:
Uptime, better asset utilization, faster reaction times

UTILITIES:
Grid modernization, automation and workforce optimization

GOVERNMENT/DEFENSE:
Response to security threats, natural disasters, secure operations and safety

HEALTHCARE:
Patient monitoring, tracking equipment, remote health

RETAIL:
B2C customer experiences, dynamic store management

FINANCE:
New customer experiences and improved asset utilization

Real-Time Scale
Big Data
Security
IoT/M2M covers a wide market

The Internet of Things
M2M accounted for 2% of cellular connections in 2010, rising to 19% in 2020

- At the end of 2010 there were 135 million cellular M2M connections, accounting for 2% of all cellular connections
- By 2020 M2M’s share of cellular connections will have increased to 19%, or 2.3 billion devices
- M2M accounts for 36% of the growth in cellular connections from 2010-20

Source: Machina Research
M2M Market from an SP’s perspective

Viewed as growth area but no big bets yet

High Growth Opportunity

- **Connectivity**: 28%¹ CAGR in no. of connections by 2020
- **Process**: 37.6%² CAGR in value added services for M2M
- **Big Data**: 30%³ growth in data collection points (sensors)

Service Provider’s Strategy

- **Compete**: Just ahead but not far ahead e.g AT&T Foundries
  - Differentiate against SPs
  - Focus on key customers
- **Collaborate**: Optimize costs & investment risk e.g Orange DT alliance
  - M2M platform capability
  - Global coverage feature
  - Multiple vertical solution
- **Control**: Maximize revenue share e.g Sprint & Chrysler
  - Pro-active messaging
  - Leverage key verticals

Service Provider Roles

- **Connectivity**: $2B⁴
- **Process**: $45B⁴
- **Big Data**: $332B⁴

$332B⁴ Connectivity + Integration + Data platform + Apps

1. Machina Research
2. Harbor Research 2009
3. Mckinsey Study- Big Data, May 2011
4. 2020 Network Operator Revenue – Machina Research

¹ CAGR: Compound Annual Growth Rate
² CAGR: Compound Annual Growth Rate
³ Growth in data collection points (sensors)
⁴ $332B: 2020 Network Operator Revenue – Machina Research
## Benefit pillars of M2M use cases

<table>
<thead>
<tr>
<th>Financial Model</th>
<th>Operating Model</th>
<th>Customer Model</th>
<th>New Value Propositions</th>
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<td><strong>New revenue stream</strong></td>
<td><strong>Faster response</strong></td>
<td><strong>Better experience</strong></td>
<td><strong>New bundled services</strong></td>
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<tr>
<td>Remote monitoring services</td>
<td>Emergency services by rapid mobilization</td>
<td>Service availability made public</td>
<td>Connected services make work simpler and safer</td>
</tr>
<tr>
<td>• Home security</td>
<td>• eCall for connected car (E112/911)</td>
<td>• Smart parking</td>
<td>• Smart connected vehicle (DSRC)</td>
</tr>
<tr>
<td>• Increase oil reserve</td>
<td>• Medical response</td>
<td>• ITS (traffic flow)</td>
<td>• Manufacturing automation</td>
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<tr>
<td><strong>Revenue uplift</strong></td>
<td><strong>Downtime avoidance</strong></td>
<td><strong>Simpler integration</strong></td>
<td><strong>New revenue model</strong></td>
</tr>
<tr>
<td>Context-aware promotions</td>
<td>Through better asset monitoring</td>
<td>Easier to pair components of multi-vendor systems</td>
<td>Pay-as-you-go</td>
</tr>
<tr>
<td>• Amazon Kindle</td>
<td>• Preventive maintenance</td>
<td>• Connected home</td>
<td>• Vehicle insurance (progressive)</td>
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<tr>
<td>• Online ad (Google)</td>
<td>• Connected rail</td>
<td>• Connected plant floor</td>
<td>• Road tax/toll (Netherlands)</td>
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<tr>
<td><strong>Reduced costs</strong></td>
<td><strong>Auto-replenish</strong></td>
<td><strong>More interaction</strong></td>
<td><strong>New products</strong></td>
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<tr>
<td>Connected facilities optimized for less energy use</td>
<td>Assets can self-order</td>
<td>Products update status to customers</td>
<td>Connected products that save money and improve effectiveness</td>
</tr>
<tr>
<td>• Smart metering</td>
<td>• Vending machine</td>
<td>• Connected refrigerator</td>
<td>• Connected lighting (Philips)</td>
</tr>
<tr>
<td>• Energy control and HVAC</td>
<td>• ATM</td>
<td>• Connected household appliances</td>
<td>• Drones</td>
</tr>
</tbody>
</table>
M2M services revenue breakdown

**Source:** ABI Research, 2012

**Diagram:**
- **2012**
  - 90% Connectivity

- **2015**
  - 30% Connectivity
  - 30% Application Enablement
  - 20% Network Connectivity & Management
  - 10% Business Intelligence

**M2M Value Added Services (VAS):**
- Application Enablement
- Application Services, Provisioning & System Integration

**MNO Influence through investment & partnerships:**
- SIM Module/Device Facilitation
- Network Connectivity
- Connection Management

**MNO Core Value Proposition:**
- MNO Self-Builds CDP or acquire from 3rd party
- MNO partners with AEP vendor
- MNO partners with ASP or SI

**Customers**

Source: ABI Research, 2012
M2M stacks for capturing services revenue – What is your M2M platform evolution?
M2M Architecture for Mobile Operators – Phase 2

M2M Applications

M2M Application Enabler / Device & Asset Management

Cisco Quantum Suite

Policy & SLA

Analytics

Billing

SON

MINE (Subscriber Abstraction)

M2M Devices

ASR 5000 / ASR5500

GGSN

SGSN

SGW

MVG

CSCF

PGW

MME

PCRF

IPSG

TTG/PGD/ ePDG/HNB-GW

Mobility Intelligent Management System

MUR

InTracer

Real Time Collector

EMS

Quantum RAN Optimization Suite

XMPP

Partners / Cisco

XMPP - HTTP RESTful

• ASR5000
• ASR5500
• Virtualized Mobile Packet Core (vEPC)

Partners / Cisco

Cisco Quantum Suite

Partners / Cisco

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Cisco M2M-enabled Mobile Packet Core Solution benefits

- M2M-enabled Mobile Packet Core provides M2M App Layer with valuable info:
  - RAT (Radio Access Type): 2G/3G/4G/WiFi
  - E2E QoS management & control (think Mission Critical verticals, i.e.: TeleHealth)
  - Network Status (i.e.: congestion, nodes down)
  - UE / Device location information (for those devices with no GPS capabilities)

- M2M-enabled Mobile Packet Core plays key role in multi-service, mixed networks:
  - Prevent Network Signaling meltdown – throttling and back-off mechanisms
  - System/Network scalability to support explosive growth
  - Provide Real Time, unified billing (all OTT M2M services today are non-real time)
  - Support standards-based (ie: 3GPP, ETSI) solution and proprietary M2M deployments
MPC/EPC - XMPP client in Packet Core

- Real-time session state intelligence
- Data capture, inspection, steering
- Subscriber, Application and Network aware
- Layer 1 through Layer 7
- Access independent
- XMPP clients tied into individual functions
- Also be used to connect directly to M2M Device & Asset Mgmt Layer

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<th>ASR 5000 / ASR5500</th>
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<td>GGSN</td>
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XMPP clients tied into individual functions.
M2M optimized Mobile Packet Core Areas of focus

- Packet Core information to SDP / M2M Apps
  - Direct connection
  - Via MINE layer (XMPP or RESTful standard interfaces)
- Congestion and Signaling Overload Control
- Policy Enforcement & Quota Management
- Security aspects of M2M
- Device & Asset Mgmt optimization (OMA-DM / IP)
- Standards-based implementation (3GPP / ETSI)
- Virtual Private Networks / Tunneling
- Multiple Access (2G/3G/LTE, WiFi, Femto, Cable/DSL)
- M2M-specific billing
Quantum – Network Abstraction Layer (MINE)

MINE (Subscriber Abstraction)

- Expose network and subscriber intelligence in a controlled manner
- One stop shop for information
- Feeds real-time information
- Aggregated information available for providing value added services
- Allows data to be presented in different formats
- Provide the work flow and the complex event processing engine
Cisco M2M Architecture for Mobile Operators

Cisco Quantum Suite

M2M Applications

Policy & SLA  Analytics  Security  Billing

M2M Application Enabler / Device & Asset Management

Cisco Ecosystem

OSS
BSS

Partners / Cisco

XMPP - HTTP RESTful

MINE (Subscriber Abstraction)

Partners / IOT

ASR 5000 / ASR 5500

M2M Devices

Mobility Intelligent Management System

- MUR
- InTracer
- Real Time Collector
- EMS

ASR5000
ASR5500
Virtualized Mobile Packet Core (vEPC)

Cisco Ecosystem

- MINE (Subscriber Abstraction)
- Mobility Intelligent Management System
- M2M Applications

Cisco M2M Application Enabler / Device & Asset Management

M2M Applications

M2M Devices

Partners / Cisco

XMPP

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Application Example

M2M dashboard

- SIM search
- SIM status
  - active: 1,400
  - activation ready: 598
  - test ready: 321
  - inactive: 793
  - retired: 521
- Message center
  - alarms: 2
  - alerts: 3
- Asset status
  - online assets: 18,921
  - offline assets: 671
  - unregistered assets: 1,753
- Manage configurations
  - total assets: 21,345

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Virtualization of Telco Cloud – M2M view

- “M2M in a box” includes all elements to launch M2M Services in SP/MNO
- Easy to scale Up and Down
- Flexible deployment model
- Trials Q3-Q4’CY13
- Aligned with Cisco M2M/IoT Ecosystem (multi-partner)
- Low initial investment
- Supported by Cisco Services
M2M Use Cases
Mobile Operator M2M Hybrid Architecture

Macro Network

Wireless Clients
M2M devices

MME
HSS
AAA
PGW
SDN
SGW
HSS
AAA
PGW
SDN
SGi
www.

S1U
S11
S6a
S5
Gx
DRA

PCRF

M2M Network

MME
SGW
PGW
HSS
AAA

M2M Mgmt
M2M App Enabler
M2M Device/SIM Mgmt
MINE
XMPP
XMPP/HTTP REST
MURAL

S1U
S6a
Gx
SGi

M2M network
Use Case: Tracking Mobile Assets

Location information (initial ULI)
QoS information
Security

Cisco E2E Solution Value Add:
- Device location info
- QoS info
- E2E Security
- Others?

Over the Top M2M service cannot deliver same type of service (lack of information)
Use Case: Remote Health Monitoring
End to End QoS for mission critical applications

Health ASP Service
- ASP Customer take medical reading on the move with SIM device (or at home)
- Customer ranges out of coverage, loses connection to mobile network
- Customer forgets a reading; ASP signals operator to connect to device

Operator Value Add
- Mobile / Fixed Connectivity, IP address, Secure Data Transmission, QoS
- Alerts Health ASP of lost connection, escalates situation to resolution
- Network-initiated data session, awaken M2M device to transmit data
Other M2M Use Cases

- **Fleet Management solutions – ready to go**
  - Engine and equipment logs – oil, tire, diesel, coolant etc.
  - Location, Speed, Acceleration Trucking logs
  - Load information status of the load, temp, icing

- **Connected Car**
  - Pay as you drive Insurance – ready to go
  - High End Car, High cost Construction Equipment - Geo Fence, where are the assets
  - Construction Equipment – management, location, status
  - E11 911 service for car systems – mandated requirement
  - Car telematics – info on car capabilities

- **Product - Location information status**
  - High end Container products – Temp, humidity, acceleration
  - Tracking high end products

- **App Enabler Customization**
  - App Enabler offers advanced customized telematics
  - Customized web platform for building M2M solutions and monitoring M2M devices.

- **Utilities Monitoring – Required by local government**
  - Cisco End-to-End solution offers the best cost-optimized solution.
  - Electric, Gas, Water metering
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backup
Cisco Solution for IoT/M2M (aka MTC)
Cisco Solution M2M Enhancements

- **Congestion Control and Avoidance**
  - Offers operator the ability to schedule sessions during minutes when the network is lightly loaded
  - Lower cost M2M transmission will avoid competing with High ARPU Smart Phone Traffic.
  - More efficient use of radio resources

- **Radio Access Change**
  - Allows the M2M device and the Operator to change the Radio Access link depending on conditions. Load, Cost, Throughput etc
  - Allows device to move to the right radio for the job.
  - Much better balance radio resource control over all radios, 2G, 3G, 4G and WiFi

- **Dynamic Session Control**
  - Allows M2M device and application to ask for higher QoS for sessions
  - Change upper limit on Speed tier
  - Monitor session via analytics and take action to preserve session
  - Allows mission critical sessions to get through – Medical Defibulators
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