OMG Technical Meeting Special Event - 2013

M2M: The Rise of The Machines

Les Santiago

About Me

Les Santiago
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Les Santiago is a Research Director within IDC's Semiconductors Research practice. His primary responsibilities include covering the mobile and wireless and M2M markets. Les is a semiconductor research veteran with extensive experience in industry, equity and proprietary research, M&A, business development, product engineering and management, and market and technology assessment. Prior to joining IDC, Les was a principal at Reuters Insight's semiconductor research practice. Les also spent a number of years as a senior research analyst at Piper Jaffray, UBS and Citigroup covering the semiconductor, enterprise hardware and distribution industries. He also served as an associate vice president in the semiconductor technology mergers & acquisitions practice at Robertson Stephens Inc. In addition, he has more than six years of experience in the enterprise computing industry, having held various product engineering and management positions at Oracle Corporation in Redwood Shores, Calif., and Network Software Associates in Irvine, Calif.

Les holds a master's degree in business administration from the Wharton School at the University of Pennsylvania in Philadelphia and a master's degree in computer engineering from the University of Southern California in Los Angeles. He also has a bachelor's degree in electrical engineering from Bangalore University in Bangalore, India.

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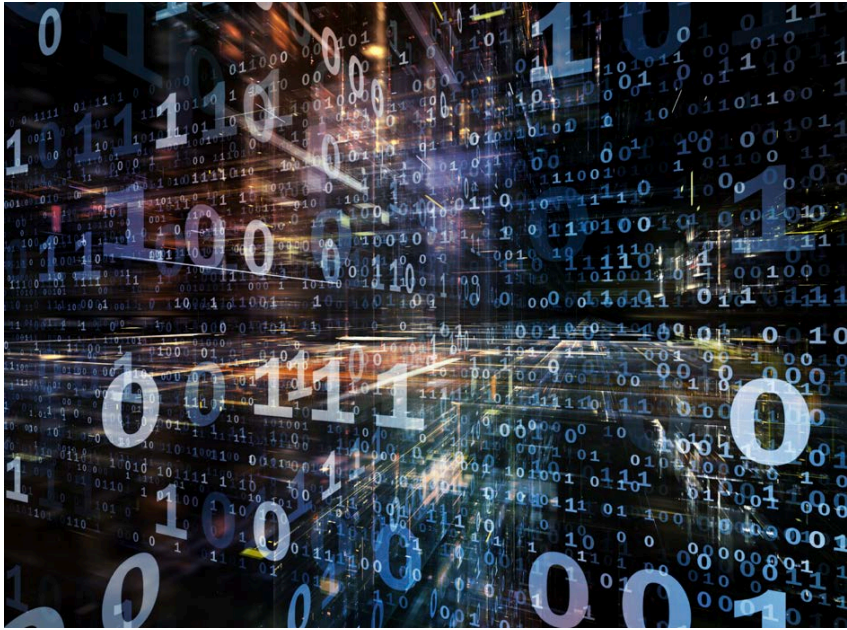
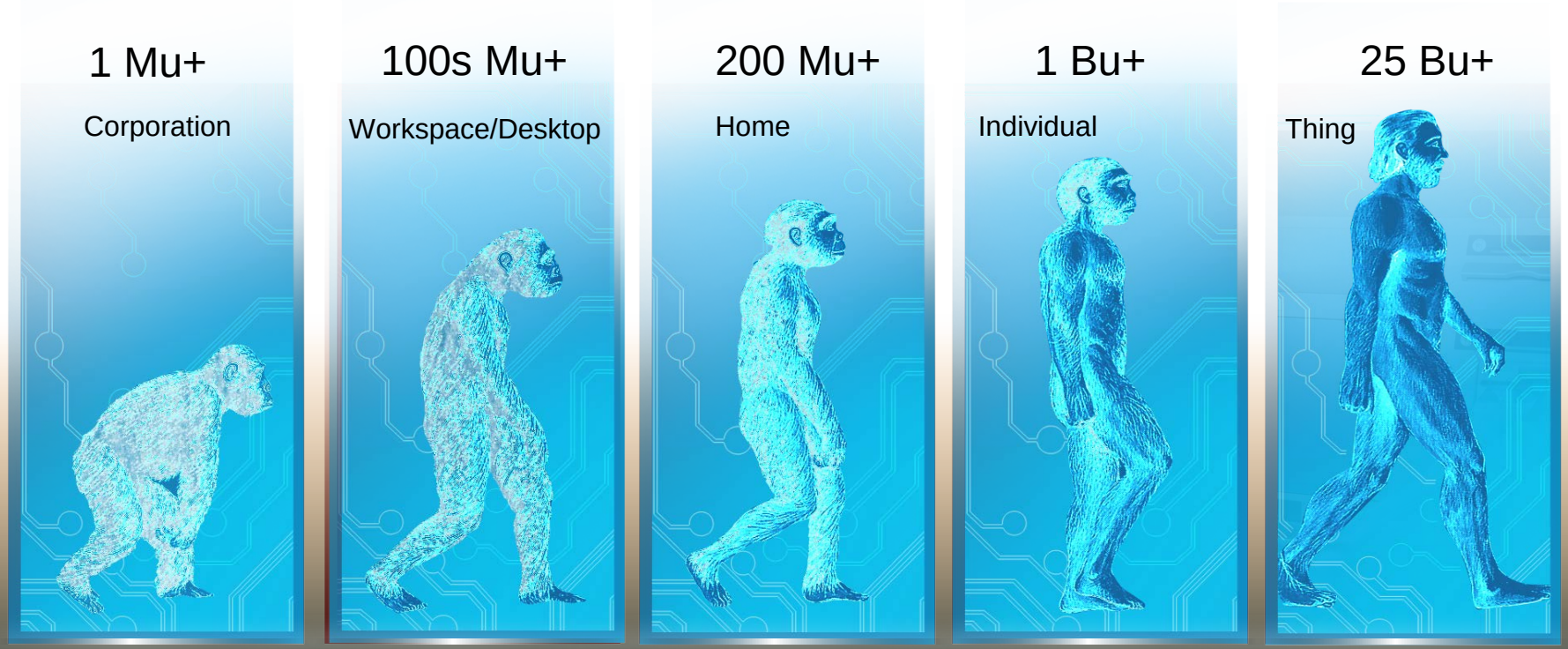
Agenda

- Overview
- Business Transformation
- Key M2M Industries
- Market Sizing
- M2M Challenges



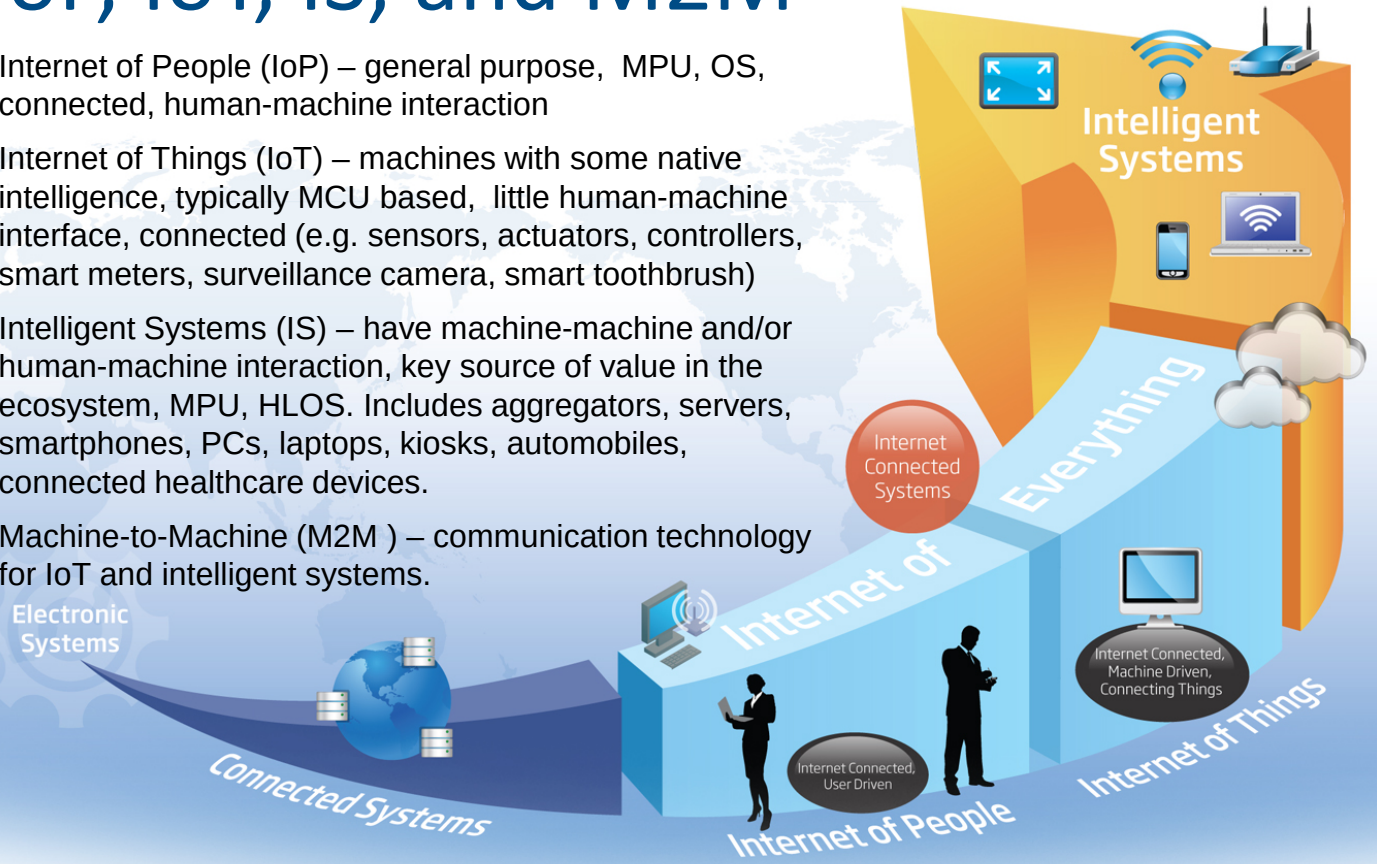
Technology Evolution



Mainframes | **PC** | **Laptops** | **Mobile** | **M2M (IoT/ Intelligent Systems)**

IoP, IoT, IS, and M2M

- Internet of People (IoP) – general purpose, MPU, OS, connected, human-machine interaction
- Internet of Things (IoT) – machines with some native intelligence, typically MCU based, little human-machine interface, connected (e.g. sensors, actuators, controllers, smart meters, surveillance camera, smart toothbrush)
- Intelligent Systems (IS) – have machine-machine and/or human-machine interaction, key source of value in the ecosystem, MPU, HLOS. Includes aggregators, servers, smartphones, PCs, laptops, kiosks, automobiles, connected healthcare devices.
- Machine-to-Machine (M2M) – communication technology for IoT and intelligent systems.



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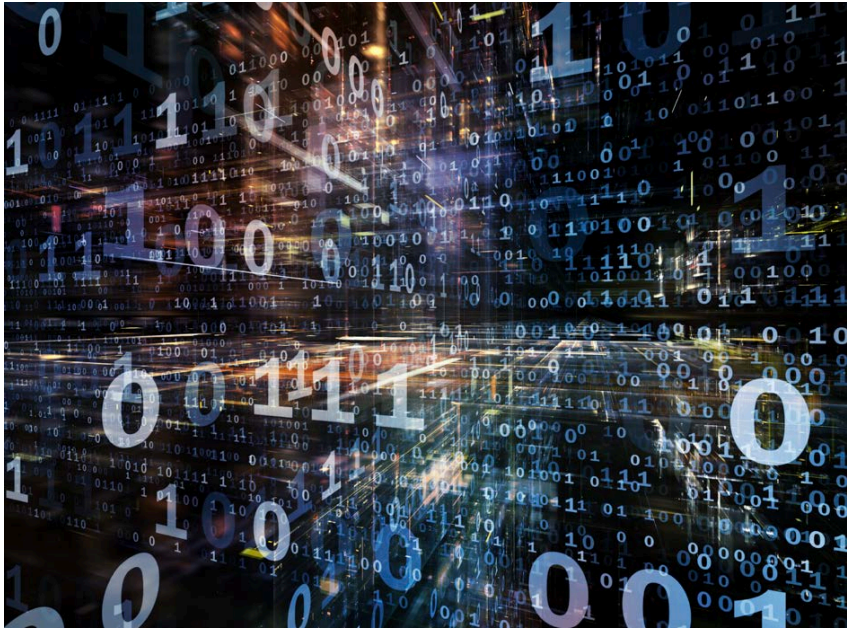
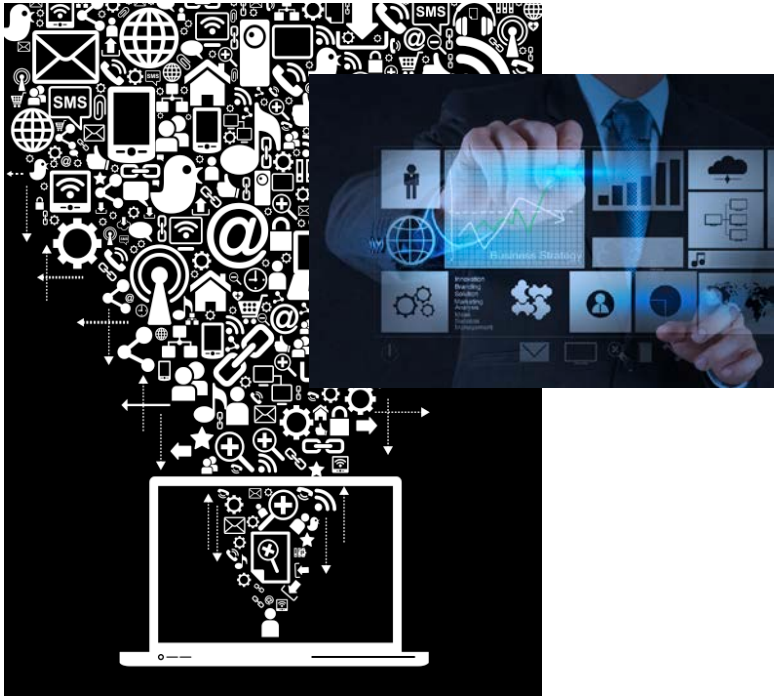


Changing Nature of Information

Current State Of Information – resides in proprietary databases, analyzed using management reports.

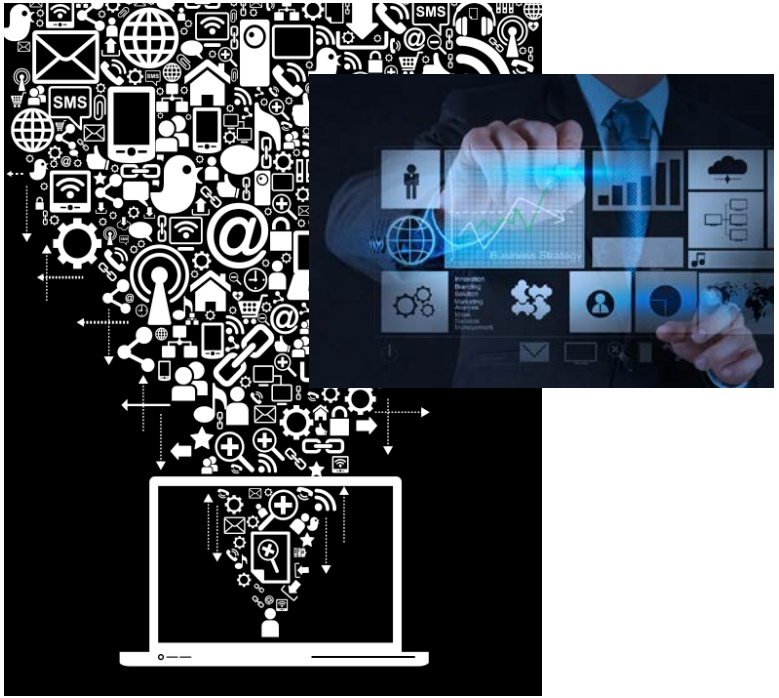
Future – the physical world will generate a huge amount of real time data that will flow to computers in the cloud for analysis.



Ability For Business Transformation

Phase I– process efficiencies, automation and reduction of human intervention, information analysis

Phase 2– the ability to transform businesses by delivering new real-time business models, revenue streams, new levels of customer service, to go where business models have not gone before.

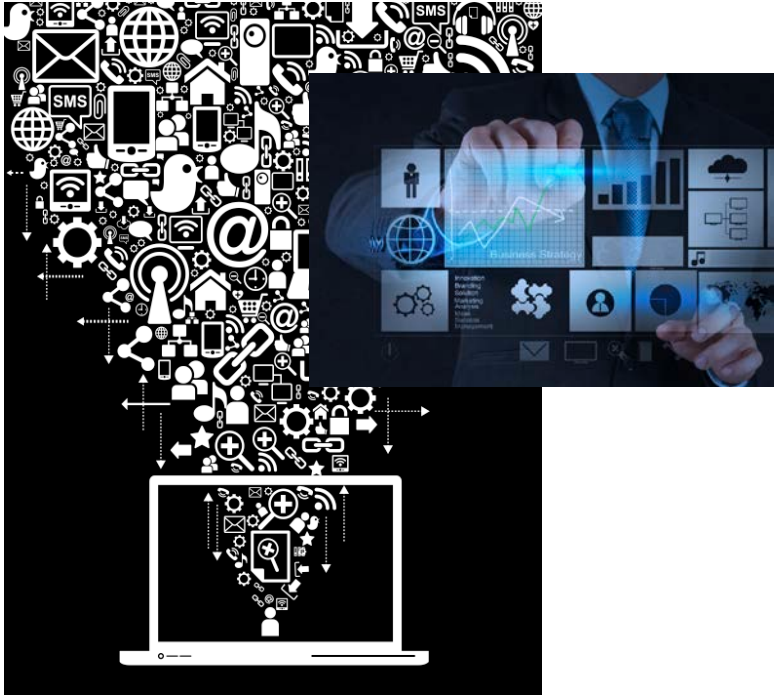


New Business Models

Current Business Models– strategies based on historical data and information and forecasts.

Future Business Models – huge amounts of real time data will offer new ways of creating value

- •Real Time CRM – real time knowledge of when a customer will need customer support
- •Knowledge of usage patterns – usage fees versus product sale
- •Increased efficiency – manufacturing or industrial processes with a multitude of sensors
- •Hazard management – intelligent objects automatically detect hazards and take corrective action
- •Remote Monitoring – access to new ways of delivering post-hospitalization or preventive medical care



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Key Enablers (% of M2M Value Chain)

Semiconductor Providers (~10%) – providing the modules, semiconductors, embedded MPUs/MCUs and sensors

Connectivity Providers (~15%)– Connectivity and service provisioning

Application Providers (~20%) – Vertical focused

Platform Providers (~20%) – Application, Middleware, Device Enablement, Security, Billing, Services

Business Analytics (~20%) – real time data and information analysis. Typically cloud enabled.

Professional Services/Solution Providers (~15%)– Design, implementation, operation and maintenance

Enabling Technologies

Sensors/Controllers - 16 bit moving to 32 bit, integrated with PAN/LAN connectivity, battery life > 10 years, energy harvesting

Intelligent Systems/Devices – MPU Based, HLOS, aggregators, collectors, servers

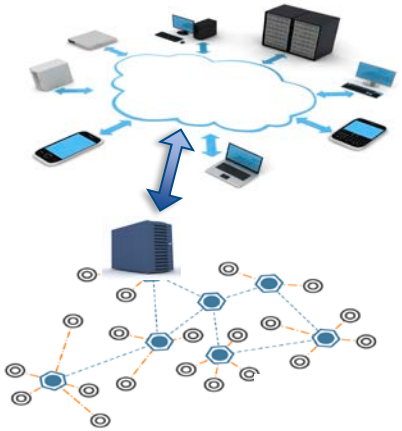
Connectivity – combination of WAN (cellular) and LAN/PAN (wireless sensor networks) technologies.

- Operator, MVNO, Grid Service Provider
- Module Prices from $5-$10 per MB per month a couple of years ago to $0.50 per MB per month today

Software

- Applications, Middleware and Platforms
- Billing and OSS
- Business Analytics

Security and Management – Embedded Security Stacks



Green. Smart. Wireless. enocean

LoWPAN
IPv6-based Low-power Wireless Personal Area Networks

WirelessHART

ISA 100 WIRELESS

2G

2.5G

3G

4G

Wi Fi

ZigBee

The Standards Debate – M2M Connectivity

WSN/Sensor Networks

LAN/PAN

802.11a/b/g/n/ac

802.11p (DSRC)


WAN

Satellite

BPON/EPON/GPON (Fiber)

DOCSIS (Cable)

DSL(Copper)

The Standards Debate – M2M Platforms

Standards

oneM2M

ITU

FG eHealth

ETSI

World Class Standards

Others

Open Source

TRIDIUM

AllJoyn

m2m eclipse.org

Viewbiquity

XACT TECHNOLOGY

Alliances

intel Intelligent Systems Alliance

m2m alliance

Deutsche Telekom

Proprietary

ILS technology enabling intelligence

Jasper wireless

SIERRA WIRELESS

RACO wireless

accenture

Axēda

nPHASE

ThingWorx

KORE

seecontrol

vodafone

Numerex

Airbiquity

More than 60 platforms

The Standards Debate – Data Protocols

DATA COLLECTION

- **MQTT - Messaging Queuing Telemetry Transport**
- **COAP - Constrained Application Protocol**

DISTRIBUTED SYSTEMS

- **DDS – Data Distribution Service**

APPLICATION/ORGANIZATION DATA PROCESSING

- **AMQP – Advanced Message Queuing Protocol**

M2M Security Debate

Top Priority For M2M Deployments – end to end, vertical focus

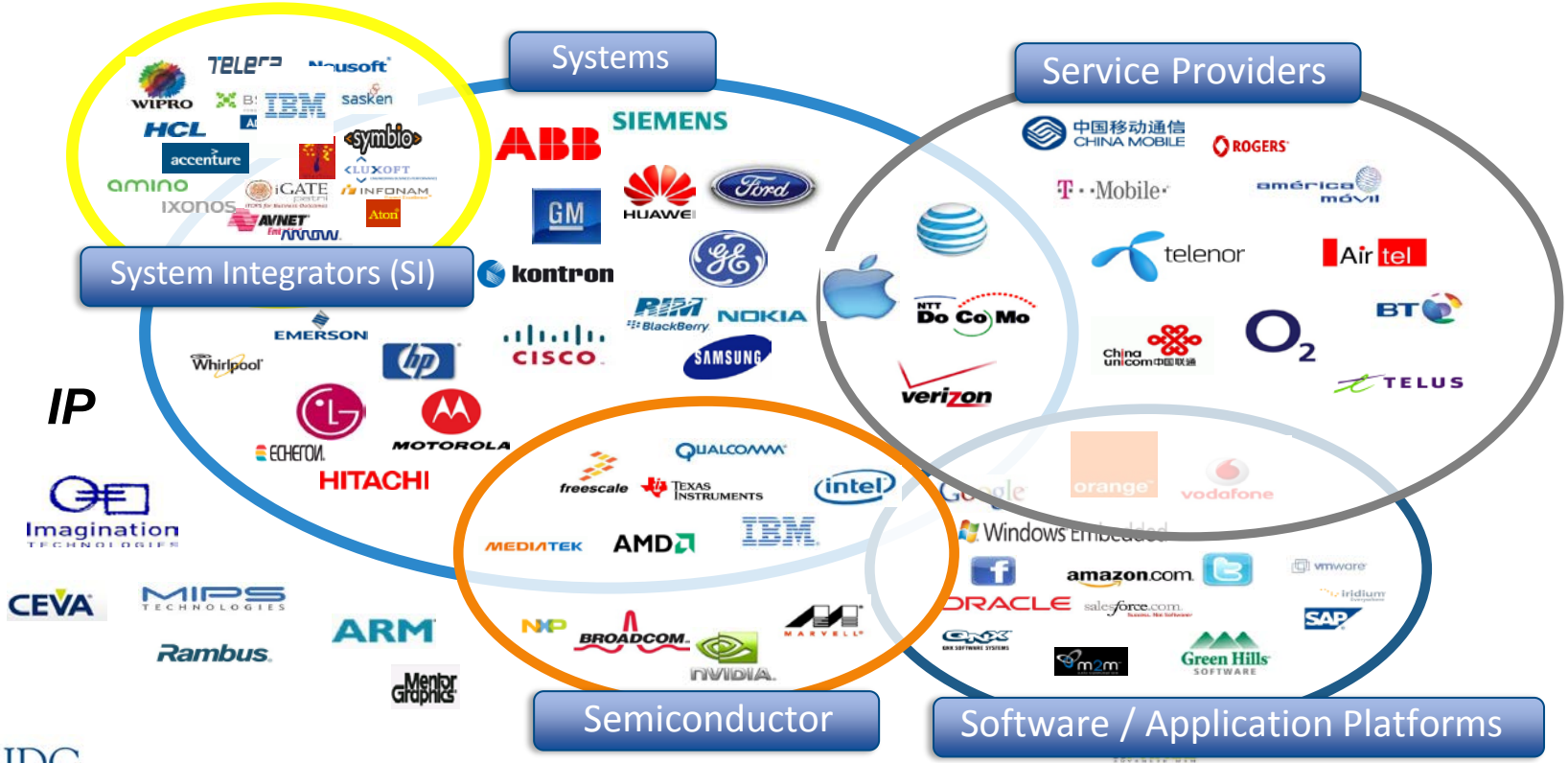
Key Technologies (Some combination of the below needed depending on device)

-Boot level security
-Secure distribution of updates to remote node
-encryption and authentication
-certificate management
-small footprint FIPS 140-2 certified encryption and authentication
-embedded firewalls (static/rules based filtering, stateful packet inspection, lockdown mode, threshold based filtering)
-behavioral security (sudden surge of data from a particular SIM)

Enterprise Mission Critical M2M Applications – device security (device identification, authentication), data security (encryption)

M2M Suppliers

List of companies does not include every player in the market



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Key areas of interest versus deployments

Areas Of Interest

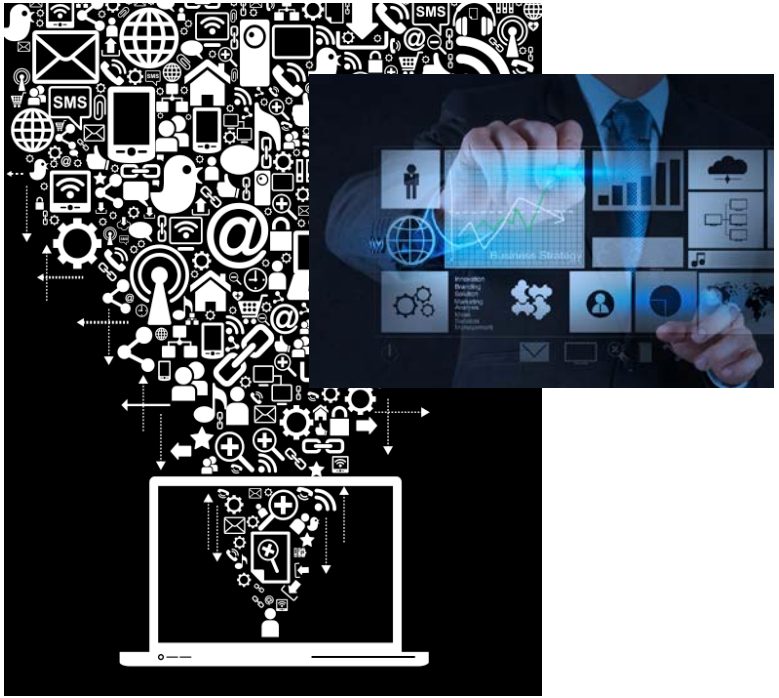
- Automobile
- Healthcare
- Energy/Smart Grid
- Smart Home
- Industrial

Areas Of Deployment

- Asset and Fleet Management
- Utilities/Smart Grid
- Security And Surveillance

Business Impetus

- Process and Efficiency Optimization
- New Business Models
- Competitive Advantage
- Regulation



Healthcare Drivers

Drivers

Regulation

- Meaningful Use
- Privacy
- Outcome Based Payments

Cost Reduction and Process Optimization

Impediments

Falling Healthcare IT budgets in Europe – “Only 12% of IT budgets available for growth initiatives”.

Reducing cost and increasing ROI mandates for CIOs

Areas Of Deployment

Connected Devices Within The Hospital

Remote Monitoring/mHealth

EMR and meaningful use

- Section 3025 of the Affordable Care Act added section 1886(q) to the Social Security Act establishing the Hospital Readmissions Reduction Program (HRRP)
- HITECH Act and Meaningful Use
- HIPPA Privacy and Security Rule Update 2013
- IDC estimates that by the end of 2016 more than 10 million households in the United States will have a wirelessly connected personal health or medical device. In addition, more than 23 million wireless connected personal health or medical devices will have shipped in the United States by the end of 2016.

Automobile Drivers

Drivers

- New Business Models
- Hazard Reduction
- EU mandates
- New Technologies - Self Driving Cars
- Competitive Advantage

Impediments

- Capex and ROI challenges
- Security

Areas Of Deployment

- Infotainment
- Diagnostics
- Connectivity With Transportation Systems
- Usage Based Insurance

- 500M automobile unit opportunity, 20-25 sensors in the car
- EU Mandates – M2M equipped car standardization
- LTE modules are primarily finding demand in the automobile vertical given need for future proofing.
- Key requirements for M2M modules
  - Quality
  - Guaranteed Form Factor (Scalability)
  - Global Investment Protection
- Anchor apps: Logistics, Diagnostics, Infotainment
- Fleet Opportunity for operators

Energy/Smart Grid Drivers

Drivers

- Reduction in connectivity costs
- European Government Mandates
- Increase in Electric Vehicles

Impediments

- Connectivity/module costs
- Capex and ROI challenges
- Security Considerations – Data management, ingress

Areas Of Deployment

- Electric Smart Meters
- EV Charging and Payment Processing

- US smart grid deployments relatively slow compared to Europe
- European government mandates – 80% of homes connected to smart meters by 2020
- Operator driven models are becoming much more efficient compared to private networks given operator's changing role from wholesaler to solution provider
  - AT&T Smart Grid Service For Duck River
- EV charging and payment processing could provide new impetus
- Gas/Water smart meter deployments very slow.

Industrial Drivers

Drivers

- Process Optimization
- Efficiency Optimization
- Manufacturing Optimization
- Cost Reduction

Impediments

- Capex and ROI challenges
- Standards
- Security

Areas Of Deployment

- Manufacturing
- Engine Efficiency
- Reduction of Human Intervention
- Waste Reduction

- Efficiency and optimization value proposition
- GE Industrial Internet initiative in focus
  - "For energy, 1 percent fuel savings translates to $66 billion. For aviation, 1 percent fuel savings translates to $30 billion. For healthcare, 1 percent operational savings translates to $63 billion." – GE Analysis
  - Taleris – JV with Accenture
  - RailConnect
  - GridIQ – monitoring utility grids
  - Subsea Integrity Management
  - Fuel and Carbon Solutions for airlines

M2M System Revenues and Shipment Forecast

M2M Revenues and Shipments			
	2013	2020	CAGR
M2M System Installed Base (M)	1,500	15,288	39%
M2M System Shipments (M)	537	5,823	41%
M2M System Revenues ($M)	$ 798.00	$ 2,116.00	15%

Note: Includes Computing, Consumer, Energy, Retail, Healthcare, Industrial, Transporation, Wireless and Wired Communications

Source: IDC, 2013

M2M Distributed Systems Revenues and Shipment Forecast

M2M Revenues and Shipments - Distributed/Industrial Systems			
	2013	2020	CAGR
M2M DS Installed Base (M)	72	2033	61%
M2M DS Shipments (M)	22	599	60%
M2M DS System Revenues ($B)	$ 33	$ 218	31%

Note: Includes Computing, Consumer, Energy, Retail, Healthcare, Industrial, Transporation, Wireless and Wired Communications

Source: IDC, 2013

M2M DDS Opportunity

M2M DDS Middleware Opportunity Forecast			
	2013	2020	CAGR
M2M DS System Revenues ($M)	33,277	217,809	31%
Software Infrastructure Revenues ($M)	2,995	23,959	35%
DDS/Deterministic Middleware ($M)	$ 90	$ 1,198	45%

Note: Includes Computing, Consumer, Energy, Retail, Healthcare, Industrial, Transporation, Wireless and Wired Communications

Source: IDC, 2013

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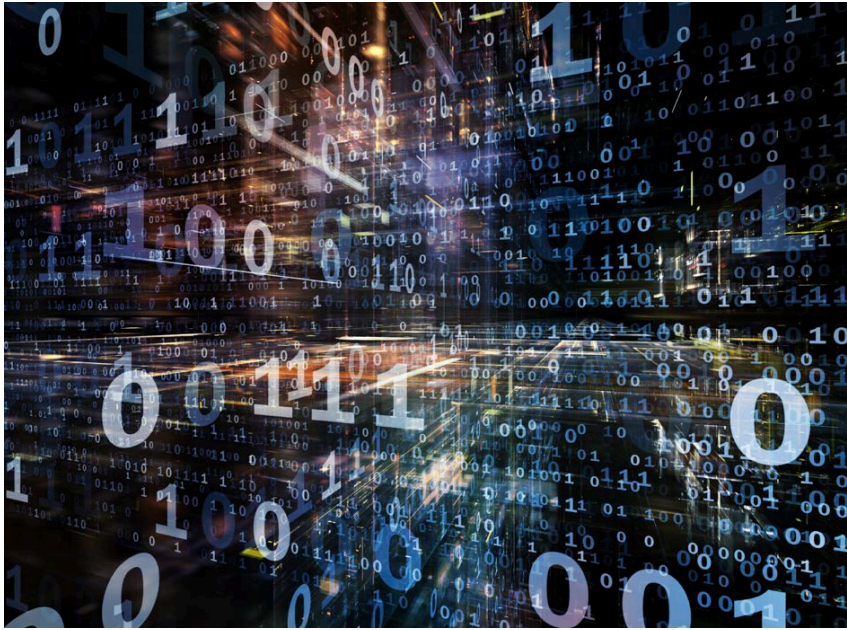


But Even Today…The M2M Opportunity Is Not Demand Driven

Primarily driven by Suppliers And Regulation/Mandates – operators, system integrators , M2M platform providers attempting to drive new revenue streams.

Enterprise IT is not in state of readiness for M2M – once an enterprise connects 100,000 devices to the Internet-

-Who will manage, provision and support the devices?

- M2M stack versus enterprise IT stack? What levels of integration are needed?

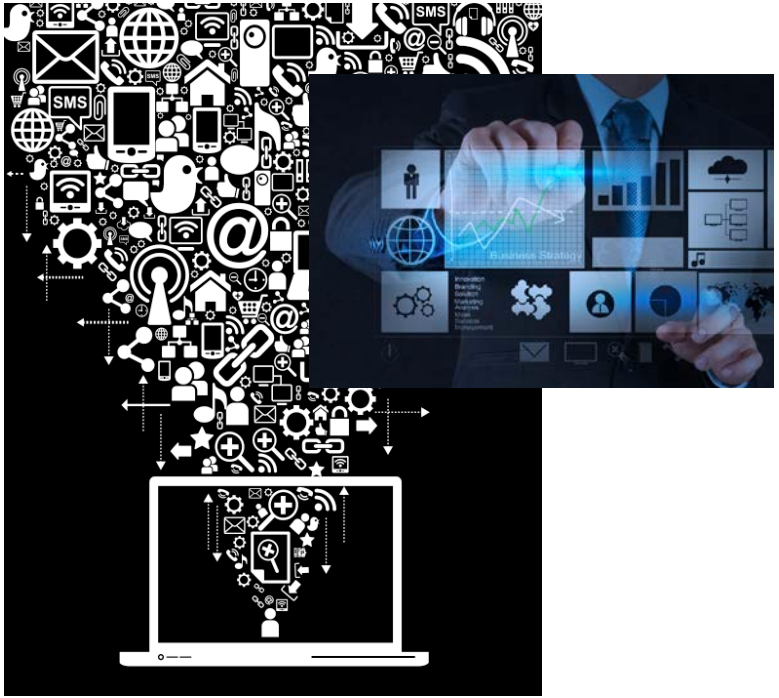
-Where will all the data generated be stored?

- How do I benefit from reams of real-time data?

- Capex versus ROI?

Real-Time Data Analytics – lagging the overall M2M ecosystem.

M2M Manpower – Need technologists with vertical expertise.



Challenges

M2M Drivers Today
•Suppliers marketing value proposition
•Regulation driving activity in a number of industries
•Demand driven – when, how, what needs to be done?

Lack Of Standardization
•Investment protection
•Choice of Appropriate IoT Protocols
•Multiple Suppliers

Global Roaming/Scalability
•Will a cellular enabled M2M device work in all the geographies that a merchant sells into?
•Is there local support and service?

IT Budgets And Preparedness
•Are enterprises willing to expand their IT budgets for an M2M implementation?
•Increased upfront operational costs?

Lack of Awareness and M2M Focused Talent
•How do we educate enterprises to think about M2M at a business transformation level?
•What kind of M2M Talent is needed to drive the M2M market?

Big Data, Analytics, Applications
•When will the promise of Big Data catch up to the market? Generating and storing data is expensive.
•Vertical application ecosystem development ? Software APIs, standards needed?

Contact Information

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