



The Internet of Things really is things, not people

Deloitte predicts that in 2015 one billion wireless Internet of Things (IoT) devices¹ will be shipped, up 60 percent from 2014,² and leading to an installed base of 2.8 billion devices.³ The IoT-specific hardware (which could be a more expensive cellular modem, or a much cheaper Wi-Fi chip) is likely to be worth \$10 billion,⁴ and the associated services enabled by the devices worth about \$70 billion.⁵ Services include all of the data plans that may be necessary to connect a device over a network, the professional services (consulting, implementation, or analyzing the data) and then things like an insurance policy discount for a telematics device in a car or a wearable device for health purposes.

IoT hardware and connectivity revenues are growing at about 10-20 percent annually, while the apps, analytics and services are growing even more rapidly at 40-50 percent.⁶ While the press may focus on consumers controlling their thermostats, lights and appliances (from washing machines to tea kettles), Deloitte predicts that 60 percent of all wireless IoT devices will be bought, paid for and used by enterprises and industries. And over 90 percent of the services revenue generated will be enterprise, not consumer.⁷

The Internet of Things is also referred to as the Machine-to-Machine (M2M) market, and is often used interchangeably (see: A brief history of Internet of Things terminology).⁸

A brief history of Internet of Things terminology

Many devices and sensors have been able to communicate with each other, normally through wires and using technologies such as SCADA (supervisory control and data acquisition).⁹ Occasionally they have been connected through wireless radio signals over certain broadcast frequencies. As cellular phone systems were rolled out in the 1980s at different frequencies, they generally transmitted voice conversations but not data for machines. As 3G was deployed from 2001, it became relatively easy to have a machine or sensor communicate over the now-data-friendly cellular network. Industry analysts needed to distinguish between the two types of traffic, so everything involving voice calls was put in one category, and every data-only device into another, called Machine-to-Machine or M2M. Over time, M2M became a broad category encompassing all telematics over cell networks on trucks, smart utility meters, eReaders, tablets and PC modems, but not smartphones.

Even today, many M2M industry forecasts include eReaders, tablets and PC modems; but this seems inappropriate. Although there is the occasional automatic update or download, most of the traffic via these three devices is human-initiated and human-observed; and they often use cellular for only some of the time, and Wi-Fi (or other short range wireless technologies such as Bluetooth, or ZigBee) for the majority of traffic. Finally, with the advent of Voice-over-IP technology, putting these three devices into a different category from smartphones is not helpful, nor is lumping them together with telematics, machines, or sensors. Following a 2014 Deloitte report on the IoT ecosystem, we are going to "focus more on 'machines' and less on 'people'".¹⁰ The Internet of Humans is an important topic, but a different one.

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1. Deloitte is not including the Information and Entertainment sector in this analysis. We have categorized Smart TVs, game consoles, set top boxes and the like as being part of the Internet of Humans, rather than the Internet of Things. See: Internet of Everything Market Tracker, ABI Research, as accessed on 16 December 2014: <https://www.abiresearch.com/market-research/product/1017637-internet-of-everything-market-tracker/>
2. Source: Gartner, who estimate device unit sales (excluding Information and Entertainment) for 2014 at 636 million and forecast 2015 sales of 1.015 billion units. See: Gartner Forecast: Internet of Things, Endpoints and Associated Services, Worldwide, spreadsheet download, Gartner, 20 October 2014: <http://www.gartner.com/document/2880717> [Registration required]
3. Gartner Forecast: Internet of Things, Endpoints and Associated Services, Worldwide, Gartner, spreadsheet download, 20 October 2014: <http://www.gartner.com/document/2880717> [Registration required]
4. We calculate the value of a \$10 IoT module within a \$40,000 car as worth \$10, and not as a \$40,000 IoT-enabled device. Deloitte estimates that the average cost of an IoT modules will be about \$10, so a billion units are about \$10 billion in IoT specific subsystem hardware revenues, although embedded in larger devices worth collectively hundreds of billions of dollars.
5. Gartner has excluded most of the Internet of Humans Information and Entertainment services revenue from their \$69.5 billion services forecast: "Video media service revenue and video game ecosystem revenue are excluded from the information and entertainment category, but the revenue from both segments is available in "Forecast Analysis: Consumer Video Media Services, Worldwide, 3Q14, 5 December 2014" (G00269649), and "Forecast: Video Game Ecosystem, Worldwide, 4Q13" (G00246826)." See: Gartner Forecast: Internet of Things, Endpoints and Associated Services, Worldwide, spreadsheet download, Gartner, 20 October 2014: <http://www.gartner.com/document/2880717> [Registration required]
6. IoE, Enterprise & M2M, ABI Research, as accessed on 9 December 2014: <https://www.abiresearch.com/market-research/practice/ioe-enterprise-m2m/> [Registration required]
7. Gartner total service revenues for 2015 are \$69.5 billion, while consumer services revenues excluding Information and Entertainment will be \$5.2 billion, or 7.5 percent. See: Gartner Forecast: Internet of Things, Endpoints and Associated Services, Worldwide, spreadsheet download, 20 October 2014: <http://www.gartner.com/document/2880717> [Registration required]
8. Internet of Things vs. Internet of Everything – What's the Difference?, ABI Research, 7 May 2014: <https://www.abiresearch.com/whitepapers/internet-of-things-vs-internet-of-everything/> [Registration required]
9. SCADA, Wikipedia, as accessed on 9 December 2014: <http://en.wikipedia.org/wiki/SCADA>
10. The Internet of Things Ecosystem: Unlocking the Business Value of Connected Devices (page 5), Deloitte Development LLC, 15 August 2014: <http://www2.deloitte.com/xe/en/pages/technology-media-and-telecommunications/articles/internet-of-things-ecosystem.html>

Modern wireless technology, whether cellular or Wi-Fi, allows a consumer with a smartphone to perform multiple useful tasks remotely: from controlling appliances to home security, climate control and lighting. But Deloitte is forecasting that the total consumer demand in 2015 for this kind of solution will be 90 percent smaller than the enterprise market. Why?

In the consumer context, M2M usually solves only part of the problem. Turning a washing machine on remotely, being notified when the cycle is finished offers some level of convenience compared to pushing a button on a machine in the basement. But the clothes still need to be sorted, carried to the laundry room, pre-treated, placed in the machine and soap added. In other words, the portion of the task that M2M improves is trivial.¹¹

The cost saving from using an appliance during off-peak hours is real but minimal. Starting a clothes dryer in the evening rather than noon takes advantage of lower electricity rates where offered. But even if a dryer is used daily, this only saves about \$50 per year.¹²

Sometimes the cost is prohibitive: one connected home lighting kit, consisting of a controller and two bulbs, costs \$150, with each additional bulb costing \$60.¹³ A connected living room lit up by six IoT bulbs would cost nearly \$400; six halogen bulbs and a dimmer switch cost about \$50.

Full IoT is sometimes overkill. For example opening a garage door or starting a car remotely is a binary on/off task. A simple radio remote control, costing about \$40,¹⁴ accomplishes the same job at a fraction of the price.¹⁵

Or the task that an M2M device may perform is 'low touch': the majority of homeowners seldom change their climate settings, and their on/off patterns are predictable, as most of us have predictable routines. The conventional programmable thermostat is adequate for most homes, and is already installed, understood, and paid for. In addition, the ecosystem for connecting and controlling devices is highly fragmented, which limits opportunities for higher-value cross-application uses.

Finally, the powerful customization and data analysis that is possible through IoT is not of interest to most consumers: they are not looking for numbers, they are looking for insights. Even then, behavior is a limiting factor: humans are resistant to modifying their behavior to fit with systems; they prefer that systems adapt to meet their needs with minimal change in human behavior. As an example, an electrical utility installed smart meters in millions of homes, expecting that (among other benefits) consumers could look at an online dashboard of their monthly usage, and modify their behavior to save money and benefit the environment. Three years after the meters were deployed, about six percent of households had viewed the dashboard at all, and fewer than two percent had done so more than once.¹⁶

So if consumers do not need them, should we bother installing M2M smart meters at all?

We should, because enterprises can benefit.

For example, deploying smart meters in the UK has been estimated to generate annual savings of just over \$40 per household, or \$2 billion for households across the whole country.¹⁷ For the electric utilities, the combined savings from the other benefits of IoT could be multiples of this amount. The savings from automated meter reading, short-circuit detection, and better real-time diagnosis/location of power outages comes to over a billion dollars annually, or about the same size as the aggregate consumer savings. But the most significant benefit comes from the analytics about consumer demand for power around peak power periods. This could save billions of dollars annually by obviating the need for between one and three new power plants, each of which could cost up to \$37 billion.¹⁸ The total saving for the utilities could be five or even ten times as large as the savings for consumers.

As discussed earlier, the direct benefit to most consumers from remote control of their washing machines is likely to be marginal; but the value to the machine manufacturers is enormous, not just for the information about reliability and advance warning of when a failure is about to occur, but for real-time information on which features are actually being used and how. The insights revealed by this stream of data could be worth hundreds of dollars per machine over its life,¹⁹ recouping the cost of making IoT-enabled washing machine tens of times over.

11. Based on experimental data, five laundry loads were washed and dried. Total time of doing all tasks (not counting the machine time of doing the washing and drying) averaged 180 seconds per load, of which turning the machines on was under five seconds.
12. This obviously varies by appliance power usage and local electricity rates and off-peak discounts. In Ontario Canada, off-peak rates are 7.7 cents per kilowatt hour (kWh), versus 11.4 cents during mid-peak periods. The average dryer load takes about an hour at 3500 watts, or 3.5 kWh; or 27 cents off peak and 40 cents mid-peak. The difference of 13 cents means that even at one dryer load per day, only \$47.45 would be saved annually. See: Smart Meters and Time-of-Use Prices, Ontario Ministry of Energy, 30 October 2014: <http://www.energy.gov.on.ca/en/smart-meters-and-tou-prices/>
13. This is a pretty cool lighting project: The Alba, by Stack Lighting, Gigaom, 11 September 2014: <https://gigaom.com/2014/09/11/this-is-a-pretty-cool-lighting-project-the-alba-by-stack-lighting/>
14. Avital 4103LX Remote Start System with Two 4-Button Remote, Amazon, as accessed on 9 December 2014: http://www.amazon.com/Avital-4103LX-Remote-System-4-Button/dp/B002P4P1G2/ref=lp_15736151_1_1?sa=auto-motive&ie=UTF8&qid=1417807933&sr=1-1
15. A fully connected car offers many potential applications, ranging from self-diagnosis for repairs, telematics for insurance, and even autonomous driving. Once vehicles are connected for those purposes, features such as remote start will also be possible, but for most cars remote starting on its own is unlikely to be a common reason for investing in a M2M link.
16. According to a large North American electrical utility that wishes to remain un-named.
17. Smart meters will save only 2% on energy bills, say MPs, BBC News, 9 September 2014: <http://www.bbc.com/news/business-29125809>
18. First nuclear power station in a generation given go-ahead... but costs soar £8 BILLION before construction even starts, Daily Mail, 8 October 2014: <http://www.dailymail.co.uk/news/article-2784913/First-nuclear-power-station-generation-given-ahead-costs-soar-8-BILLION-construction-starts.html>
19. All data in this paragraph is from an Internet of Things data analytics company in Canada. Thanks to Mnubo co-founder Aditya Pendyala. See: Home page, Mnubo, as accessed on 9 December 2014: <http://mnubo.com/>

In a real-world example, a manufacturer spent millions of dollars and several months building a low-energy automation feature that required customer opt-in. IoT data from users showed that less than one percent of customers actually used it; this prompted the company to change it to a self-learned energy management feature that deployed automatically, translating into customer cost-savings benefits.

Annual sales of cars with embedded telematics are expected to exceed 16 million units in 2015,²⁰ but it is unclear how many consumers will actually use all those features. As one example, millions of cars have buttons to summon roadside assistance, but in an era of ubiquitous smartphones many drivers never use this service.

But insurance companies have interest in the driving data, and offer discounted insurance rates to drivers who opt-in and have after-market devices installed.

Sales of 22 million units including after-market are expected in 2015,²¹ and this is likely to save money from discounted insurance and reward safe driving.²²

Despite all the media excitement around consumer uses for the Internet of Things, most items are selling in their hundreds of thousands as connected devices, sensors or controllers; very few are selling in their millions.

Meanwhile enterprises are buying and using tens or even hundreds of millions of IoT devices. Smart meters, smart grids, smart homes, smart cities and smart highways are just some examples. Factories, mHealth, shared transportation solutions (such as car and bike rentals) or resource industries can all benefit too.

20. Connected car forecast: Global connected car market to grow threefold within five years (page 5). GSMA, June 2013: http://www.gsma.com/connectedliving/wp-content/uploads/2013/06/cl_ma_forecast_06_13.pdf
21. 89 million insurance telematics subscribers globally by 2017, ABI Research, 10 February 2012: <https://www.abiresearch.com/press/89-million-insurance-telematics-subscribers-global>
22. Consumers buy telematics for the cost saving, keep it for safety, Telematics.com, 27 August 2014: <http://www.telematics.com/telematics-blog/consumers-buy-telematics-cost-saving-keep-safety/>
23. Internet of Things vs. Internet of Everything – What’s the Difference? (Page 6), ABI Research, 7 May 2014: <https://www.abiresearch.com/whitepapers/internet-of-things-vs-internet-of-everything/> [Registration required]
24. The Internet of Things Ecosystem: Unlocking the Business Value of Connected Devices, Deloitte Development LLC, 15 August 2014: <http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Technology-Media-Telecommunications/gx-tmt-iotecosystem.pdf>
25. Based on Tesco case studies presented in the following sources: Customer Analytics and the Next Best Offer: Improving Your Timeliness and Relevancy, Deloitte Dbriefs, Deloitte US, 14 June 2012; Philip Kotler et al., Chapter 5: Creating Customer Value, Satisfaction, and Loyalty, Marketing Management (Pearson, 2009)

Bottom Line

In 2014, the IoT analytics market is primarily descriptive (\$800 million), a little bit of predictive (\$180 million) and minimally prescriptive (\$14 million). Over the next four years, while IoT analytics revenues of all three types is likely to grow by 500 percent, the prescriptive subset is likely to grow over 3,000 percent.²³

IoT vendors may want to extend cost-reduction and risk management deployments to explore revenue and innovation potential. Often, IoT is seen as a technology that is driven by the CIO. Since CIOs are not typically focused on revenue growth and innovation, providers who sell only to the CIO will usually revert to talking about lowering transaction and maintenance costs. Cost reduction is not bad, but it also is not enough and the potential for adoption and business value may be broadened by reaching out to CMOs, CFOs, major line managers, and even CEOs.²⁴

Growing IoT may mean focusing on product and/or customer lifecycle. The retail sector offers examples of how companies can benefit from using real-time data to move beyond transactions and understand their customers and products better. For example, a UK-based retailer used their loyalty club card to track customer visits, buying behavior, payment modes, and inventory. By paying close attention to customers (customer lifecycle) and product sales (product lifecycle), the retailer was able to adjust merchandise dynamically to suit local tastes, customize offers to customers, manage inventory volume based on demand/purchases, and plan inventory refresh as needed. The result? Sales, customer loyalty, and coupon redemption rates all increased.²⁵

We expect many firms to target early deployments to maximize impact. This seems counter-intuitive, since the power of IoT grows exponentially as the number of connected devices increases. But in the early days, enterprises may want to find the single biggest pain point or revenue opportunity, and roll out an inexpensive solution, such as a sensor network, which will simplify the ROI justification.

Connecting devices that were unconnected before creates opportunities, but also requires a fundamental shift in business model. A connected product is no longer just a product; it is a service. For example, a connected coffee machine is an insights tool for restocking and usage profiling to optimize coffee pods supply chain and increase customer lifetime value. However, connectivity also introduces new risks, and enterprises need to develop security that is both preventative and responsive in order to lower costs and increase operational efficiency.

Customers have concerns about privacy: what data is an enterprise collecting in M2M, and what are they doing with it? It will be important for companies to maximize transparency in order to enhance user trust: there will likely be a balance between perceived costs and benefits by customers, and the willingness to share information by consumers will vary by application.

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