2015: Year of the Internet of Things?

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Introduction

Every New Year industry pundits and prognosticators begin by saying "This is the year of ____," add your favorite theme in the blank — be it Cloud, Internet of Everything (Cisco)/People (Salesforce.com)/Things (the rest of the world), Industrial Internet (GE), Software-Defined Data Centers, Software-Defined Networks, Software-Defined Storage, etc. We won't make any predictions here, but expect IoT to make a major impact on businesses. This growth will occur not just in 2015, but over the next decade, although, as expected, there are many challenges to overcome. We use the term *IoT* to include *Everything*, *People*, *Things*, and the *Industrial Internet*.

IoT Growth

There are numerous predictions about the number of things connected to the Internet, either wired or wirelessly, and the related economic impact they will create, over the next few years.

Here are some examples:

- ABI Research estimates the number of devices will more than double from 2014 to 40.9 billion by 2020.
- Cisco estimates 25 billion devices connected to the Internet by 2015 and 50 billion by 2020. Between 2013 and 2022, $14.4 trillion of value (net profit) will be up for grabs for enterprises globally.
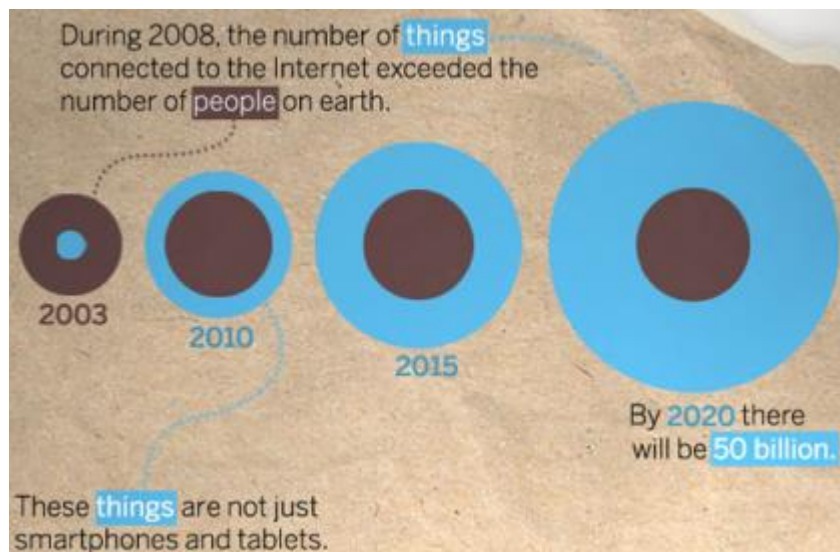
Source: Cisco

- Ericsson estimates connected devices could reach more than 50 billion over the next decade.
- Gartner expects 26 billion units installed by 2020, with $1.9 trillion in global valued-added services.
- GSMA & Machina Research estimate IoT to have global impact of $4.5 trillion in 2020, with 18 billion devices by YE2022.
- Hammersmith Group expects that 100 billion devices will be connected to the Internet by 2020.
- IDC expects the installed base of the Internet of Things will be approximately 212 billion "things" globally by the end of 2020, including 30.1 billion installed "connected (autonomous)" things.
- Intel predicts IoT will grow from 2 billion objects in 2006 to 200 billion by 2020.
- McKinsey Global Institute estimates the potential economic impact of IoT to be between $2.7 trillion and $6.2 trillion per year by 2025.

Challenges for IoT Growth

Sensitel believes the primary goals in IoT are to track, transform, engage, and protect enterprises through IoT solutions. But there many challenges to achieving these goals:

1. Privacy and Security

Privacy and security are intertwined—a security breach is an attack on privacy. Recent security breaches at J. P. Morgan Chase, Sony, and Chick-fil-A continue to play havoc in corporate America. It doesn't matter whether these were sponsored by rogue countries or the work of disgruntled employees, the damage has been done. If intelligence is embedded in millions of smart devices, such as a Nest Thermostat connecting with your utility and fire stations, attacks on devices in IoT will have more devastating effects—possibly affecting transportation (attacking traffic signals), chemical and industrial plants (SCADA systems), manufacturing floors (robots, CNCs, and other machine tools), and power grids, including transmission lines and smart meters. Privacy and security issues will impede the adoption of wearables, such as Google Glass, Fitbit, and personal healthcare devices. These risks demand creating new models for rules-based access control, identity management, privacy, and security, such as personal data banks proposed by Prof. Pentland of MIT.

2. Standards

There are three major alliances/consortia trying to establish IoT standards. Table 1 shows partial lists of the current members.

AllSeen Alliance has 112 members, including 11 premier members, 84 community members, and 17 sponsored members. Industrial Internet Consortium has about 120 members. Open Interconnect Consortium has less than 50 members. Which one of these is going to prevail in the long run and drive standardization is anyone's guess.

Table 1. IoT Alliances and Consortia

AllSeen Alliance (December 2013)	Industrial Internet Consortium (March 2014)	Open Interconnect Consortium (July 2014)
Premier-level Members: Haier, LG Electronics, Panasonic, Qualcomm, Sharp, Silicon Image, and TP-LINK. **Community Members**: Canary, Cisco, D-Link, doubleTwist, Fon, Harman, HTC, Letv, LIFX, Lite-oO, Moxtreme, Musaic, Sears Brands Management Corporation, Sproutling, The Sprosty Network, Weaved, and Wilocity.	**Founding Members:** AT&T, Cisco, GE, IBM, and Intel. **Non-founding Members:** MITRE Corporation, PrismTech, PurFresh, Real-Time Innovations, and Vanderbilt University.	**Founding Members**: Atmel, Broadcom, Dell, Intel, Samsung, and Wind River.

3. Device and Power Management

Many of the billions of devices will require low power or be even battery-powered. However, the cumulative power requirements will be enormous, mandate long battery lives and reliable, dynamically scaling power supplies. With loss of battery power, will we end up with Internet of Orphaned Things?

4. Scalability

With billions of smart devices expected to be deployed in the next five years, managing and provisioning these will be a crucial requirement and require very highly scalable hardware and software tools to achieve it. Energy-efficient, microservers possibly with hundreds, if not thousands, of cores may be the norm.

5. Device Diversity

Of the billions of devices, there is bound to be a plethora of classes of devices programmed in a wide variety of traditional and scripting languages—C, C++, HTML, PERL, Python, Ruby-on-Rails, and others. Managing these, guaranteeing interoperability, and ensuring QoS and SLAs require deep expertise in these software tools and the associated middleware.

Conclusions

Despite all the challenges discussed above, IoT adoption WILL happen. The winning players will be those who overcome one or more of these challenges through breakthrough solutions, focus on the end benefits and net new capabilities, and turn these challenges into opportunities.